

BIOLOGICAL ABSTRACTS

Now published in FIVE MONTHLY SECTIONS *in addition* to the present Complete form.

For some time there has been a demand from individual scientists to separate BIOLOGICAL ABSTRACTS into smaller units to cover one specific field of Biology. Sectional publication, beginning with the January issue for 1939, has been adopted to meet this demand. The individual scientist will now be able to subscribe to just the part he wants. Not only that, the Index to the complete volume is included in the subscription.

One or more of these sections should appeal to every scientist working in Biology. The prices have been made as low as possible. Our effort is to give you the best possible abstracting and indexing service and yet be able to continue as a self-sustaining, non-profit organization.

SECTION A—ABSTRACTS OF GENERAL BIOLOGY will include General Biology, Biography-History, Bibliography, Evolution, Cytology, Genetics, Biometry and Ecology. Priced at \$4. (Foreign \$4.50.)

SECTION B—ABSTRACTS OF EXPERIMENTAL ANIMAL BIOLOGY will include Animal Physiology, Nutrition, Pharmacology, Pathology, Anatomy, Physical Anthropology, Embryology, Animal Production and Ecology. Priced at \$9. (Foreign \$9.50.)

SECTION C—ABSTRACTS OF MICROBIOLOGY, IMMUNOLOGY AND PARASITOLOGY will include Immunology, Bacteriology, Viruses, Parasitology, Protozoology and Helminthology. Priced at \$5. (Foreign \$5.50.)

SECTION D—ABSTRACTS OF PLANT SCIENCES will include Phytopathology, Plant Physiology, Plant Anatomy, Paleobotany, Systematic Botany, Agronomy, Horticulture, Forestry, Pharmacognosy, Pharmaceutical Botany and Ecology. Priced at \$6. (Foreign \$6.50.)

SECTION E—ABSTRACTS OF ANIMAL SCIENCES will include Paleozoology, Parasitology, Protozoology, Helminthology, Systematic Zoology, Economic Entomology and Ecology. Priced at \$6. (Foreign \$6.50.)

Subscribers to one or more of these sections will receive the Indexes to the whole of BIOLOGICAL ABSTRACTS.

The complete BIOLOGICAL ABSTRACTS with Indexes, as published in the past, will be \$25 for Volume 13, 1939, to individuals and institutions, domestic and foreign, postpaid.

Send Your Order Now!

BIOLOGICAL ABSTRACTS

University of Pennsylvania
Philadelphia, Penna.

GENERAL BIOLOGY

Editors: A. H. GRAVES, *Plant*; C. A. KOFOID, *Animal*

(See also in this issue Entries 36, 137, 1083)

PHILOSOPHY OF BIOLOGY

1. BEUTNER, R. The independent nature of morphogenesis and self-reproduction and its significance for the cosmic development of life. *Biodynamica* 38. 1-7. 1938.—Artificially produced non-living structures show morphological characters resembling those of living matter; but they do not possess the power of self-reproduction. Some filterable viruses, of enzymatic nature, on the other hand, possess the power of self-reproduction but no known morphogenetic character. It seems then that morphogenesis and self-reproduction are independent and separable features of living matter. In the cosmic development of life, these 2 features became associated. Various morphological characters resulted of physicochemical interactions in complex self-reproducing compounds.—*Auth. summ.*

2. PRESCOTT, C. H. The scientific method and its extension to systems of many degrees of freedom. *Philosophy of Science* 5: 237-266. 1938.—It has been assumed that as we increase the precision of our expts. the errors will decrease. This, however, has not turned out to be true in all cases, for unexpected residua, such as X-rays, quanta, etc., have manifested themselves. As a consequence it has become necessary for scientific theory to take into account added degrees of freedom, which are provided by introducing new parameters. Science, regarded as method, consists essentially in the search for correlations and for relations among correlations. The "explanation" of a correlation is not some fundamental or absolute principle, but some other correlation. Any distinguishable aspect of reality depends on an infinity of parameters, but a scientific theory is necessarily erected on a finite number of independent variables. Thus the art of scientific analysis is to extricate the dominant parameters and to ignore those whose effects are either constant or small. Parsimony requires that the number of parameters be minimized; but when further precision in measurement gives no increase in the accuracy of results, it becomes necessary either to extend the range of investigation or to look for another variable.—*R. H. Dotterer (courtesy Psych. Abst.)*.

MICROSCOPY, INSTRUMENTS, TECHNIQUE

3. REDWAY, LAURANCE D., and ADOLPH MARFAING. Technique of eye photography. *Jour. Biol. Photogr. Assoc.* 7(1): 2-5. 1938.

4. VANNI, V. Metodo semplice per la microfotografia colorata. [Simple method for colored microphotography.] *Ann. Igiene* 48(9/10): 608-609. 1938.

TAXONOMY AND NOMENCLATURE

5. SCHULZE, F. E., W. KÜENTHAL, K. HEIDER, fortgesetzt von R. HESSE. Nomenclator Animalium Generum et Subgenerum Band 5, Lieferung 24: Tachymeropis-Trichoc. pp.3373-3532. Preussische Akademie der Wissenschaften: Berlin, 1938.

EXPLORATIONS, EXPEDITIONS, ETC.

6. HU, H. H. Recent progress in botanical exploration in China. *Jour. Roy. Hort. Soc.* 63(8): 381-389. 8 pl. 1938.

MUSEUMS, ZOOLOGICAL GARDENS, AQUARIA, ETC.

7. CARABIA, J. P. The cactus garden of Harvard University in Cuba. *Cactus and Succulent Jour.* 10(5): 67-68. Illus. 1938.

8. CONILL, L., et H. GAUSSEN. Le jardin alpin de M. Vial a Font-Romeu. *Bull. Soc. Bot. France* 85(3/4): 110-112. 1938.

TEXTS AND EDUCATION

9. BUCHSBAUM, RALPH. Animals without backbones. An introduction to the invertebrates. xii+371p. 128 full leaf pl., 315 fig. University of Chicago Press: Chicago, 1938. Pr. \$3.75.—This is an abundantly illustrated elementary streamlined textbook of invertebrate zoology of college grade. It stresses principles rather than pure morphology. omits classification and most of embryology, emphasizes experimental morphology, and contains a section on invertebrate palaeontology. The illustrations consist of simplified, diagrammatic text figures and full leaf reproductions of photographs mainly of living animals. They constitute half of the pages. The material is segregated into indispensable chapters dealing with the general and elementary aspects of each phylum and optional or advanced chapters which stress the more advanced and technical morphology and subjects such as adaptation, radiation, symmetry, parasitism, regeneration, and phylogeny.—*C. A. Kofoid.*

10. DAKIN, WILLIAM J. The elements of general zoology. A guide to the study of animal biology correlating function and structure with notes on practical exercises. 3rd ed. xvi+511p. 255 fig. Oxford University Press: Oxford, 1938. Pr. 12s. 6d.—This edition contains many changes in the discussion of functions due to advances in physiology since the 1st edition in 1927 and the 2d in 1928. A new section on endocrinology and new illustrations and emendations have been added.—*C. A. Kofoid.*

11. POTTER, GEORGE EDWIN. Textbook of zoology. 915p. 15 col. pl., 440 fig. C. V. Mosby Co.: St. Louis, 1938. Pr. \$5.—Of the 46 chapters, 17 are credited to others than the principal author. Nearly $\frac{1}{2}$ of the book is devoted to the systematic treatment of the phyla but along with the discussion of classification, characteristics, anatomy of types, etc., are included many references to general principles, economic importance, life histories, etc. A novel feature is the use of western and southwestern species as types with good descriptions and illustrations of the anatomy of such forms as *Rhomaelia microptera*, *Reniceps tiburo*, *Ameiurus natalis* and *Phrynosoma cornutum*. Not generally found in college textbooks of zoology are chapters on Animal Anomalies, Effects of Radiation, Marine Zoology, including lists of typical shore animals of the Pacific and Gulf (Texas) coasts, Wildlife Conservation and Animal Behavior. For the most part these and the other chapters on general subjects are brought well up to date. While most of the illustrations are taken from published sources, there are also many new ones. Noteworthy among these are the colored plates of southwestern animals. There is a selected list of references arranged by chapters, a glossary and an index.—*J. P. Moore.*

MISCELLANEOUS

12. MARSHALL, W. T., and R. S. WOODS. Glossary of succulent plant terms. E-F. *Cactus and Succulent Jour.* 10(5, suppl.): 41-48. Illus. 1938.

13. MILLS, HARLOW B. Bugs, birds and blizzards in the Yellowstone. vii+76p. 8 pl. Collegiate Press, Inc.: Ames, Iowa, 1937. Pr. \$50.

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 5, 1083, 1280, 1310, 1333, 1377, 1520, 1534)

HISTORY

14. DEAN, GEO. A. The contribution of Kansas to the science of entomology. *Trans. Kansas Acad. Sci.* 41: 61-73. 1938.—A historical account dealing with the important workers, the insect collections, fossil insect beds, contributions, clubs and list of students trained in Kansas State College and Kansas Univ. or contributing to the subject of entomology.—F. C. Gates.

BIOGRAPHY

15. CHESNEY, ALAN M. John Shaw Billings and the Johns Hopkins Medical School; a tribute on the one hundredth anniversary of his birth. *Bull. Johns Hopkins Hosp.* 62(4): 283-296. 1938.

16. CHESNEY, ALAN M. Two papers by John Shaw Billings on medical education. *Bull. Johns Hopkins Hosp.* 62(4): 297-371. 1938.

17. DANILOV, A. N. Pamfati akad. Vladimira Nikolaevicha Lfubimenko 1873-1937. (En mémoire de l'académicien V. N. Lubimenko.) [In Russ.] *Sovetskaja Botanika [Soviet Botany] [Leningrad]* 1937(6): 139-155. Portrait, illus. 1938.

18. FRANÇOIS, E. Alfred Grandidier, botaniste. *Rev. Madagascar* 22: 27-48. Frontispiece, Illus. 1938.

19. GUNTHER, R. T. The life and work of Robert Hooke. *V. Micrographia*, 1665. Early Science in Oxford, vol. 13, x+ [36] +273p. 38 pl. Printed for the subscribers: Oxford, 1938.—This is a facsimile reprint by the Replika process of the first edition of the masterpiece by the father of microscopy in England. The editor has added a preface containing an estimate of the significance in the history of the sciences of this pioneer work and annotations on the investigations in 1663-1664 presented by Hooke by request to the Royal Society of London. It is on these contributions that the *Micrographia* was based. The analytical index from the reprint entitled *Micrographia Restaurata* (1745 and 1780) is added and a new supplementary index to this is included in the present edition.—C. A. Kofoid.

20. HUME, EDGAR ERSKINE. John Shaw Billings as an Army Medical Officer. A tribute on his hundredth birthday, April 12, 1938. *Bull. Johns Hopkins Hosp.* 62(4): 237-282. 4 fig. 7 Portraits. 1938.

21. HUNT, REID. John Jacob Abel, May 19, 1857-May 26, 1938. *Jour. Pharmacol. and Exp. Therap.* 63(2): 1 unnumbered page. 1938.—Professor Abel founded the first laboratory of Pharmacology in the U. S. He also founded the first journal devoted exclusively to pharmacology and experimental therapeutics.

22. LARKEY, SANFORD V. John Shaw Billings and the history of medicine. *Bull. Johns Hopkins Hosp.* 62(4): 372-388. 1938.

23. L'VOV, S. D. Pamfati akad. Vladimira Ivanovicha Palladina. (En mémoire de l'académicien, V. I. Palladine.) [In Russ.] *Sovetskaja Botanika [Soviet Botany] [Leningrad]* 1937(6): 155-164. Portrait. Illus. 1938.

24. LYDENBERG, H. M. John Shaw Billings and the New York Public Library. *Bull. Johns Hopkins Hosp.* 62(4): 389-398. 2 portraits. 1938.

25. MAGROU, J. Julien Costantin (1857-1936). *Bull. Trimestr. Soc. Mycol. France* 53(3/4): 245-252. Portrait. 1937(rec'd 5-18-38).—Costantin devoted his life to the study of fungi in pure culture. He made important systematic contributions to the fungi imperfecti, and in collaboration with Matruchot, Dufour, Perin and others also investigated the fungous parasites of higher basidiomycetes and animals (including man). His later efforts were devoted to mycorrhizas, including that of Irish potato.—W. A. Jenkins.

26. ROBYNS, W. G. A. Boulenger 1858-1937. Sa vie et son oeuvre rhodologique. *Bull. Jard. Bot. État Bruxelles* 15(1): 1-24. Portrait. Illus. 1938.

27. RODDIS, LOUIS H. Linnaeus—the king of the flowers. *Jour. Amer. Pharm. Assoc.* 27(3): 250-257. 3 fig. Portrait. 1938.—A brief biography.—G. M. Hocking.

28. SCHAUDE, WILHELM. Paul Martin. 15.3.1861-19.12.1937. *Anat. Anz.* 87(7/8): 147-155. 1 fig. 1938.—Martin was Prof. of Anatomy and until 1928 Director of the Inst. of Veterinary Anatomy of the Univ. of Giessen.—M. Samter.

29. ANONYMOUS. John Frederick Bailey. *Kew Bull. Miscell. Inform.* 1938(8): 350. 1938.

30. ANONYMOUS. Dr. Alexander Eig. *Jour. Bot.* 76(908): 248. 1938.—Notice of death, aged 43 years.

EVOLUTION

(See also B. A. 12(8): Entries 13108, 14074; (9): 14150, 15354, 15357)

34. COCKERELL, T. D. A. Studies of island life. *Univ. Colorado Stud.* 26(1): 3-20. 1938.—This lecture deals especially with the islands off the coast of southern California. These are 8 in number, not including smaller islets, and are remarkable for the large number of species and races of animals and plants peculiar to them. Relict endemics and true island endemics are numerous; the former spp. probably existed at one time on the mainland, while the latter undoubtedly originated, so far as their special peculiarities are concerned, on the islands. Known endemic forms are listed. Guadalupe Island, farther out in the Pacific, appears to be oceanic; the California islands appear to have been at one time connected with the mainland. Pleistocene marine beds occur at 600 ft. elevation on 2 of the islands, indicating that at some time in the Pleistocene the islands must have been nearly submerged. More than a dozen spp. of molluscs have been collected in these beds. Elephant remains on San Miguel Island show that at

another time, also during the Pleistocene, the northern islands were more elevated and were presumably connected with the mainland.—Auth. abst.

35. GREEN, R. G. Viruses, parasitism and malignant growth. *Biodynamica* 39. 1-8. 1938.—Filterable viruses are assumed to originate from visible microbes by retrograde evolution under conditions of parasitism. Adaptations of parasite to host seem responsible (1) for a simplification of the viruses into inert chemical complexes having living properties only when bathed in functioning protoplasm; (2) for an adjustment of the parasite resulting in the minimal injury to host, as is the case in the numerous cell inclusions; (3) for an adjustment of the individual reproductive properties of host and parasite and even for a hybridization of these properties. When a proliferative virus anchors in a host cell and its proliferative rate keeps pace with that of the host there results an unlimited, malignant growth.—B. Luyet.

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. McCLUNG, *Animal*

(See also in this issue Entries 1, 64, 72, 78, 80, 87, 175, 178, 179, 392, 677, 685, 694, 1134, 1168)

GENERAL

36. BENSLEY, R. R., and S. H. BENSLEY. Handbook of histological and cytological technique. viii+167p. Uni-

versity of Chicago Press: Chicago, 1938. Pr. \$2.—The first part deals with the study of fresh tissues by such methods as maceration, smearing, supravital staining, Altmann-

Gersh freezing-drying method, etc. Methods for studying living cells in vitro and in vivo are included. The 2d part is concerned with fixed tissues and constitutes the major part of the work. There are chapters on fixation and fixatives, imbedding, sectioning and mounting, stains and staining as well as chapters on such special subjects as selective stains, neurohistological methods, visible microchemical reactions, preparation of frozen sections, decalcification, and miscellaneous techniques. Throughout discussions clarify the principles that underlie the applications of the various techniques.—*E. R. Helwig.*

37. BOLDEN, FRANK E. Stain reactions in young and old tissue. *Proc. Pennsylvania Acad. Sci.* 12: 129-132. 1938.—Young chick, mouse, and salamander tissue showed different staining reactions in relation to the age of the tissue. The younger tissue stained more slowly, less uniformly and required more time for destaining than did progressively older tissues.—*F. E. Bolden.*

38. HAMAZAKI, Y. Nuclear pathology. *Trans. Soc. Path. Jap.* 28: 1-9. 1938.—A critique and systematization of research methods for the study of nuclear pathology covers the following methods: (1) Feulgen's nuclear reaction, the degree of staining appearing to correspond with the amount of nucleoprotein, (2) Hamazaki's carbol-fuchsin-iodide method, for staining 4 vars. of acid-fast granules, namely: (a) chromium acid-fast granules, (b) iron and copper acid-fast granules, and (c) mercury acid-fast granules. (3) Takeda-Ono's anilin water dahlia method, a simple saturation staining method adapted for demonstrating karyogenic pigment. (4) Sugiyama's method for staining perinuclear granules in the leucocytes, using brilliant azur B supravivally as well as after fixation. The perinuclear granules appear to originate from basic nuclear protein (histone and protamine). The observations made by means of these 4 methods indicate that both the nucleoproteins and their decomposition products, particularly the pyrimidin derivatives, can be demonstrated satisfactorily by these specific methods.—*K. Kato.*

39. STERN, CURT. During which stage in the nuclear cycle do the genes produce their effects in the cytoplasm? *Amer. Nat.* 72(741): 350-357. 1938.—Discusses the bearing of existing evidence in *Delphinium*, *Zea*, *Ustilago*, *Lathyrus*, and *Chlamydomonas* on the problem of the stage at which the nucleus affects the cytoplasm. The decisive cases indicate that in the energetic or resting stage the nucleus is able to influence the cytoplasm. Suggests further work with those species where dimorphism of pollen grains is brought about by specific genes as a means of determining whether these genic effects occur only after the breakdown of the nuclear membrane.—*J. H. Kempton.*

PLANT

40. GATES, R. R., and C. E. FORD. Chromosome catenations in *Oenothera*. I-II. *Tabulae Biol. Periodicae* 15 (1/2): 122-144, 145-153. 1938.

41. HAMEL, J. Études caryologiques sur quelques *Bégoniacées*. *Rev. Cytol. et Cytophysiol. Vég.* 2(4): 392-413. 3 pl. 1937(1938).—The resting nucleus of *Begoniaceae* appears "homogeneous." The single nucleolus may have a protuberance which has a strong affinity for dyes. The number of prochromosomes never exceeded the number of definitive chromosomes. The prochromosomes were changed into short and long chromosomes in the prophase, and in doing so they leave the vicinity of the nuclear membrane and group themselves around the nucleolus. During prophase the nucleus must recover the chromatin lost in the preceding mitosis, and there is a general hydration of the nucleus which is manifest by an increase in volume. The chromosomes appear to split at metaphase. At anaphase the chromosomes were as small as prochromosomes. The prochromosomes take a position at the periphery of the nucleus during telophase and during this stage several small nucleoli reappear and unite to form a large nucleolus. A table is given showing the number of chromosomes in *Begoniaceae* as reported by different authors. The basic number for this family may be 6 or 7.—*W. S. Malloch.*

42. KATTERMAN, G. Über konstante, halbbeharrte Stämme aus Weizenroggenbastardierung mit $2n=42$ Chromosomen. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 74(3/4): 354-375. 1938.—This hybrid has 20 prs. of wheat

chromosomes and 1 pr. from rye. 94% of the P.M.C.'s have 21 bivalents; in chiasma frequency the plants resemble pure wheat spp.; the rye chromosome bivalent has a slightly lower average chiasma frequency than the average for the wheat bivalents. This was due to a higher proportion of rod bivalents, with chiasmata in only one arm. In both ring and rod bivalents taken separately the chiasma frequency per arm was somewhat higher in the rye chromosome. Outcrosses had more univalents and multivalents than the pure line. The plants were rather uniform morphologically. The rye chromosome influenced principally culm pubescence. The discussion emphasizes the phylogenetic importance of such "substitution hybrids."—*J. A. Jenkins.*

43. LOVE, R. MERTON. Somatic variation of chromosome numbers in hybrid wheats. *Genetics* 23(6): 517-522. 1 pl. 1938.—16 of 336 *vulgaris*-like derivatives of pentaploid wheat hybrids contained pollen mother-cells with chromosome numbers which deviated from the $2n$ number for the plant. The chromosome complements of the aberrant PMC varied from 15 to 61, and the number of bivalents varied from 3 to 29. The frequencies of plants with aberrant PMC were: Marquillo \times Iumillo F_2 , 0.98%; Marquis \times Iumillo F_2 , 2.00%; Iumillo \times R. L. 729 (Pentad durum \times Marquis) F_2 and F_3 , 5.45%; Iumillo \times Hope F_2 and F_3 , 9.09%. Aberrant PMC were found in plants with 39, 40, 41 and 42 chromosomes. Presumably they owe their origin to atypical mitoses brought about by mutually incompatible genes or incompatible gene-cytoplasm combinations in the 16 hybrid derivatives.—*R. M. Love.*

44. SALMON, JANINE. Étude cytologique des laticifères des *Lactario-Russulés* et quelques observations sur les mitoses des basides. *Rev. Cytol. et Cytophysiol. Vég.* 2(4): 376-391. 4 pl. 1937(1938).—The laticiferous cells originate in connective hyphae which have the same structure as other hyphae, differing from them only in the secretory function that they acquire. The entire development of the vacuolar system was followed in *R. jellea*, *L. hepaticus* and *L. pallidus*. This consisted in the appearance of small vacuoles which become larger and finally fused to form a large vacuolar canal. The vacuoles contained a heavy protein precipitate in *L. hepaticus*. Protein crystalloids were found in *L. hepaticus*, *L. vellereus*, *L. quietus* but were rare in *R. jellea*. In the development of the laticiferous cell, the cytoplasm is gradually resorbed, but drops of osmium reducing substance were liberated into the large vacuole where they formed an irreversible emulsion. In *L. vellereus* the diploid nucleus resulting from the fusion of 2 haploid nuclei grows enormously. The chromatic network is constructed of loose filaments which are more evident at the leptotene stage. The individual chromosomes are clearly seen at metaphase on a greatly elongated spindle. The haploid number is 4 (Wakayama reported 6). The nucleus migrates to the top of the basidium where all of the rest of the nuclear divisions occur. At the end of the heterotypic division 2 haploid nuclei are produced. This is followed by a homeotypic division, each of the 4 resulting nuclei pass through a different sterigma and enter into a spore.—*W. S. Malloch.*

45. SMITH, FRANK H. Reduction divisions in triploid *Impatiens*. *Amer. Jour. Bot.* 25(9): 651-654. 12 fig. 1938.—An analysis was made of chromosome behavior during the reduction divisions in an autotriploid of *I. balsamina*. The chromosomes are usually associated in 7 sets of trivalents at diakinesis but there is a tendency for separation to occur before they become arranged on the equatorial plate. The chromosomes are distributed at random during the heterotypic division and the homeotypic divisions proceed regularly. The triploid was highly sterile when selfed and when crossed with a diploid plant of the same species.—*F. H. Smith.*

46. SOLACOLU, T., D. CONSTANTINESCO, et M. CONSTANTINESCO. Étude anatomique et cytologique des modifications provoquées par le mélange obtenu d'une substance organo-formative et de la colchicine. *Compt. Rend. Acad. Sci. [Paris]* 207(3): 246-249. Illus. 1938.

47. TATUNO, SEIZI. Geschlechtschromosomen bei einigen Lebermoosen, VIII. [In Jap. with Ger. summ.] *Bot. Mag. [Tokyo]* 52(619): 374-379. 19 fig. 1938.—*Conoccephalus supracompositus*, ♂ $9=8+X$; ♀ $9=8+Y$. *Frul-*

lania mishiyamensis and *F. sakawana* ♂ 9=7+X, +X₂; ♀ 8=7+Y.—E. H. Walker.

48. TATUNO, SEIZI. Über Polyploidie und geographische Verbreitung bei *Dumortiera hirsuta*. [In Jap. with Ger. summ.] *Bot. Mag. [Tokyo]* 52(620): 434-441. 11 fig. 1938.—Haploid, diploid and triploid (9, 18, 27) vars. show distinctive distributions in Japan. In Tennessee the species is diploid.—E. H. Walker.

49. WIPF, LOUISE, and D. C. COOPER. Chromosome numbers in nodules and roots of red clover, common vetch and garden pea. *Proc. Nation. Acad. Sci. U. S. A.* 24(2): 87-91. 1 pl. 1938.—Infected cells of root nodules of *Trifolium pratense*, *Vicia angustifolia* and *Pisum sativum* regularly possess twice the normal diploid number of chromosomes characteristic of these plants. Both nodules and root tips from 5 plants of each species were examined.—Auth. summ.

50. WULFF, H. D. Chromosomenstudien an der schleswig-holsteinischen Angiospermen-Flora. II. *Ber. Deutsch. Bot. Ges.* 56(7): 247-254. 1938.—The chromosome numbers of numerous Angiosperms are listed. *Agrimonia eupatoria*, 2n=28; *Ceratophyllum submersum*, n=20; *Filipendula hexapetala*, n=7; *F. ulmaria*, 2n=14; *Gnaphalium luteo album*, 2n=14; *Gnaphalium uliginosum*, 2n=14; *Hottonia palustris*, n=10; *Juncus filiformis*, 2n=ca. 80; *J. lamprocarpus*, 2n=ca. 60; *J. squarrosus*, 2n=ca. 40; *J. supinus*, 2n=40; *Knutia arvensis*, n=10; *Lathyrus montanus*, n=7; *Lysimachia nummularia*, 2n=36; *L. nemorum*, 2n=18; *Oenanthe aequatica*, 2n=22; *Polygala vulgaris*, n=24-28; *Potentilla sterilis*, 2n=28; *Sanguisorba minor*, 2n=28; *Scirpus tabernaemontani*, 2n=ca. 44; *Scorzonera humilis*, 2n=14; *Sium latifolium*, 2n=20; *Sparanium minimum*, 2n=30; *S. ramosum*, 2n=30; *Stachys palustris*, n=ca. 32.—H. C. Beeskow.

ANIMAL

51. BEACH, EDITH PENFIELD. Effects of X-ray upon the snowy tree cricket, *Oecanthus nigricornis argentinus*. *Trans. Kansas Acad. Sci.* 41: 303-315. 51 fig. 1938.—Irradiation of adults reduces the number of eggs laid, inhibits cell division, and causes polyploidy. Chromosomes show a marked tendency to fragment. Abnormal spermatogonia were found only after 2 or 3 days. In spermatogonia, irradiation causes fragmentation in two of the large V-shaped chromosomes. Translocation was found after rather heavy doses. Multiple chromosome formation occurred at synapsis. 4 types of aberrations were found in 2d spermatocytes. Chromosome breaks occurred in the diplotene stage. The history of the 2 large ring-tetrads was traced through the spermatocyte stages. No unravelling stage was found. The pachytene threads seem to form (double) immediately out of the prochromosome stage. No evidence for chiasmotype was found. Evidence for delayed breakage was found. Some evidence was found which may show that breaks are caused in part by the effect of the X-rays upon the chromosome matrix.—Author.

52. BECKER, FRANCES, and MARY E. MANN. Spermatogenesis in the isopod, *Porcellio scaber*. *Jour. Colorado-Wyoming Acad. Sci.* 2(4): 27. 1938.—Each of the 3 lobules of the testis presents different stages in spermatogenesis. Elongating spermatids are in groups, usually of 6. Mature sperm are extremely long, non-motile, have the head at an angle and remain bound in colonies by a viscous epithelial secretion of the vas.—E. D. Crabb.

53. BERGER, C. A. Prophase chromosome behavior in the division of cells with multiple chromosome complexes. *Jour. Heredity* 29(9): 351-357. 4 fig. 1938.—Epithelial cells of the larval ileum of mosquitoes increase in size and become highly polyploid without mitotic activity. During metamorphosis they divide. The prophase shows (1) a synapsis of long thin threads into 6 groups each containing 8, 16 or 32 sister chromonemata, (2) a contraction into 6 much shortened and thickened groups, (3) a falling apart of each group into its constituent units, the unit being a pair of synapsed chromosomes which enter metaphase as such. The synapsed long, thin chromonemata of early prophase are very different in appearance from salivary gland chromosomes. No chiasmata are formed.—C. A. Berger.

54. BERRY, R. O. Comparative studies on the chromosome numbers in sheep, goat, and sheep-goat hybrids. *Jour. Heredity* 29(9): 343-350. 3 fig. 1938.—The diploid numbers in the amnionic cells of the 30-day-old sheep, goat, and sheep × goat hybrid were 60, 54, and 57 respectively. The hybrids were from matings between Angora ♀ goats and Merino rams. The largest 4 chromosomes in the cells of the sheep are larger than those of the goat and have a characteristic U- or J-shape. The largest 2 sheep chromosomes were identified in the hybrid. Variations in chromosome numbers were noted in some of the amnionic cells of the 3 animals. In most of the varying cells the number of chromosomes was less than the diploid number.—R. O. Berry.

55. BLUMENFELD, CHARLES M. Periodic and rhythmic mitotic activity in the kidney of the albino rat. *Anat. Rec.* 72(4): 435-443. 2 fig. 1938.—The renal cortex of 96 ♂ albino rats, 28 days old, was examined for mitotic activity. 8 specimens were obtained during each 2-hr. interval of a 24-hr. period. Thin slices of kidney were fixed in Bouin's fluid, embedded in paraffin, and sectioned at a thickness of 8 μ. An index of mitotic activity was established for each specimen by counting, at a magnification of 1000 diam. the mitoses seen in 1000 fields. Mitotic activity was greatest from 2 P.M. to 4 P.M., the mean being 59.8 mitoses per 1000 fields, and least from 10 P.M. to 12 night, the mean being 28.5 mitoses per 1000 fields. The curve plotted from the mean values appeared to be composed of 4 6-hr. segments, of which 3 were alike. This was interpreted as indicating rhythmic waves of mitotic activity. Biometric studies revealed that the mean level of mitotic activity was significantly greater during the day (8 A.M.-8 P.M.) than during the night (8 P.M.-8 A.M.); that it was significantly less during the first half of the night and significantly greater during the 2d half of the day than during the rest of the 24-hr. period. Application of these findings may prove useful in further studies of the factors regulating growth by mitosis.—Auth. (courtesy Wistar Biol. Serv.).

56. CARLSON, J. GORDON. Some effects of X-radiation on the neuroblast chromosomes of the grasshopper, *Chorthippa viridifasciata*. *Genetics* 23(6): 596-609. 1 pl., 38 fig. 1938.—Neuroblasts of grasshopper embryos treated with 100, 125, 250, 500, 750, and 1000 r suffer a cessation of mitosis for a period of time proportional to the dosage. Cells treated between telophase and early prophase show, in later stages of the same mitotic cycle, chromosome alterations, chromatid inequalities, and what may be half-chromatid inequalities. Chromatin bridges at anaphase appear to result from chromosome and chromatid translocations and fusion of sister chromatids of proximal portions of fragmented chromosomes at their broken ends. Their subsequent breakage and the passage of the broken ends into cells of the next generation make possible delayed attachments. An hypothesis is suggested to account for 3 forms, viz., V's, rings, and pairs of rods, which "chromatids" of fragments lacking spindle attachments assume as they begin to separate at early anaphase.—J. G. Carlson.

57. COOPER, ZOLA K., and ALICE SCHIFF. Mitotic rhythm in human epidermis. *Proc. Soc. Exp. Biol. and Med.* 39(2): 323-324. 1938.—In young infants (8 days old) the prepuces were removed by circumcision. The operations were done at different hrs. during the day and night (7 during the day and 6 during the night). The various specimens were then examined by a special technique to determine whether a diurnal rhythm in mitotic activity exists. In each specimen 5000 cells were counted in successive fields and the number of cells in mitosis recorded. Mitoses were much more abundant in the specimens obtained at night than in those obtained during the day.—Authors.

58. DÜRKEN, B. Über die Keimdrüsen und die Chromosomen der Artbastarde *Rana arvalis* Nils. ♀ × *Rana fusca* Rös. *J. Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 74 (3/4): 331-353. 1938.—In the hybrid frogs, all of them ♂, normal gonads are formed and copulation takes place as usual. They form little or no sperm, and none that is functional. The chromosome numbers are, *R. arvalis*, 2n=22, *R. fusca*, 2n=26, and in the hybrid 2n=24. The chromosomes differ greatly in size and morphology. No study of meiosis was made.—G. L. Stebbins, Jr.

59. ENDERS, ROBERT K. The ovum of the mink (*Mustela vison*). *Anat. Rec.* 72(4): 469-471. 3 fig. 1938.—3 ova, apparently fertilized, were recovered 52 hrs. after copulation and approx. 16 hrs. after ovulation. The eggs are free from follicle cells; the cell mass is very dark because of globules of lipid material scattered evenly throughout the cytoplasm. The ova average 141 μ in total diam.; the vitelli 107 μ . The zona is narrow and sharply defined.—Auth. (courtesy Wistar Bibl. Serv.).

60. PENNYPACKER, MIRIAM I. The chromosomes in the maturation of the germ cells of two species of triclad turbellarians. *Jour. Morph.* 63(3): 421-438. 2 pl., 11 fig. 1938.—Maturation of the germ cells of the 2 hermaphroditic spp., *Curtisia foremanii* and *Bdelloura candida*, were studied. In both spp. $n=6$, $2n=12$. A tendency of the chromatids comprising individual chromosomes to separate from one another at certain times was noted in both spp.; this results in giving the appearance of a larger no. of chromosomes than the germ cells actually possess. A further source of apparent

increase in chromosome number in *Curtisia oocytes* is the presence of some deeply staining, non-chromatin material. No significant differences in number, form and behavior of chromosomes of ♂ and ♀ complexes were noted, with the possible exception of the tendency of the chromatids to separate from one another, to be greater in the ♀ than in ♂ germ cells.—Auth (courtesy Wistar Bibliogr. Serv.).

61. WILLIAMS, ELIOT C. Jr. Spermatogenesis of a Mantid *Choeradodis rhombicollis* (Latreille). *Trans. Amer. Microsc. Soc.* 57(4): 387-394. 2 pl. 1938.—The behavior of the chromosomes of *C. r.* closely resembles that described for the other 3 Mantids that have been studied. During the primary spermatocyte division 12 autosomes pass into each secondary spermatocyte and a compound combination of sex chromosomes divides unequally. 2 small equal chromosomes interpreted as X_1 and X_2 pass to one pole of the dividing cell and one large chromosome interpreted as Y passes to the other. 2 types of sperm result, one with $12+X_1, X_2$, the other with $12+Y$.—E. C. Williams, Jr.

GENETICS

Editors: ORLAND E. WHITE, *Plant*; SEWALL WRIGHT, *Animal*

(See also in this issue Entries 39, 42, 43, 54, 58, 249, 458, 560, 598, 609, 734, 778, 784, 789, 1007, 1079, 1134, 1149, 1199, 1205, 1236, 1246, 1259, 1268, 1387, 1425)

GENERAL

62. WALLACE, HENRY A. Corn and eugenics. Excerpts from the Spragg Memorial Lecture, "Corn Breeding Experience and Its Probable Eventual Effect on the Technique of Livestock Breeding," by Secretary of Agriculture Henry A. Wallace, at Michigan State College, April 21, 1938. *Jour. Heredity* 29(9): 331-334. 1938.

PLANT

63. BABCOCK, E. B., and M. S. CAVE. A study of intra- and interspecific relations of *Crepis foetida* L. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 75(1): 124-160. 1938.—Nine strains of *Crepis*, representing 3 closely related spp.—*C. eritreensis*, *C. thomsonii*, and *C. foetida* L. sensu lato.—were studied as to comparative morphology, geogr. distribution, chromosome number and morphology, crossability, meiotic regularity, and the inheritance of certain quantitative and qualitative differences. The species are readily distinguished by differences in the flowers, fruits and involucre. They have the same chromosome number and the chromosomes are similar in size and shape. Meiosis is regular in parent strains and F_1 hybrids. Segregation in F_2 from strain crosses gave mono-, di-, and trihybrid ratios for several structural or qualitative differences, but certain quantitative differences gave extremely variable proportions and are probably conditioned by several or numerous genes. Self-incompatibility in certain strains of *C. foetida* appears, from limited data, to depend on 1, 2, or 3 independent dominant factors, the recessive alleles of which are present in other strains of *foetida* and the other 2 spp. The latter, however, appear to differ more from *foetida* in the genetic nature of their self-compatibility than the *foetida* strains differ among themselves. The 3 spp. are so close genetically that they would probably form one Rassenkreis, if their distributional areas overlapped. But *eritreensis* and *thomsonii* are widely separated from each other and from *foetida* and accordingly are recognized as species. *C. foetida* is a Rassenkreis comprising 3 subsp. and many intergrading forms. Based on all available evidence, the assumed phylogenetic relations of the 9 strains have been inferred.—E. B. Babcock.

64. BARTHELMESS, A. Mutationsversuche mit einem Laubmoos, *Physcomitrium piliforme*. I. Phänanalyse der Mutanten. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 74(3/4): 479-518. 1938.—By radiating spores with α and x-rays a large number of mutant gametophytes were obtained. The mutations described include changes in size and structure of the spores, in cell form, cell size, habit, and rate of development of the protonema, in length, reproductive ability, and sex differentiation of the stems, in shape, cell number, cell size, and cell shape of the perichaetial leaves, in form and size of the cells of the paraphyses, in size and shape of the antheridia and archegonia, in fertility, and in

many characters of the sporogonia. The eventual size of the organs of any mutant is affected by both cell size and cell number, which may differ in organs of similar size in different mutants (may be very different in cell size and cell number). Some mutants simulate polyploid *Physcomitrium* in their large cell size and reduced fertility. The mutants may include types with chromosomal abnormalities, since *Physcomitrium* is an unfavorable object for cytological study.—G. L. Stebbins, Jr.

65. BRAUN, H. Variationsstatistische Untersuchungen zur Frage der Vererbung von Krebs- und Schorfresistenz der Kartoffel. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 75(1): 55-105. 1938.—Many selfed and crossed lines of cultivated vars. of potato were tested for resistance to scab and wart disease (*Synchytrium endobioticum*) by growing them in a heavily infected field plot. The evaluation of scab infection was detd. by the impression of the harvest from 10 plants, by means of which they were grouped into 4 classes. In tests for scab statistically significant differences between the different lines in the degree of infection were found. The average degree of infection of most hybrid lines was either between that of the 2 parents, and not significantly different from that of either, or approached that of one or the other parent. One hybrid line had a significantly lower infection than either parent. The average degree of F_2 populations varied over a great range, the extremes being significantly greater and less than those of either of the selfed parental lines. There was no difference between reciprocal crosses. In selfed or crossed lines derived from plants susceptible to wart, the proportion of resistant races varied from 0% to 89.7%. The families could be grouped into 6 classes which differed significantly from each other in the percentage of resistant races. In progeny of selfed and crossed families of resistant vars., the percentage of resistant races never falls below 50%. Families with exclusively resistant races were not found. At least 5 classes could be recognized. In families derived from crossing between susceptible and resistant vars., no reciprocal differences could be found, and the percentage of resistant races varied from 5% to 91.4%, and 6 classes were recognized of which 2 possessed less than 50% resistant races. The results do not provide evidence in favor of any of the theories which have been advanced as to the nature of inheritance of the disease.—G. L. Stebbins, Jr.

66. COCHRAN, FRED D. Breeding cucumbers for resistance to downy mildew. *Proc. Amer. Soc. Hort. Sci.* 35: 541-543. 1937(1938).—Crosses between commercial vars. and foreign introductions have shown considerable resistance to Downy mildew in fall grown cucumbers in Louisiana. The majority of the foreign introductions came from India. They were all white fruited with black spines. This white fruit character was found to be due to a single recessive gene.

not linked with spine color. The selected progenies are showing much promise economically.—F. D. Cochran.

67. CUGNAC, ANTOINE de. Sur quelques Bromes et leurs hybrides. VII. *B. sterilis* L. var. *velutinus* Volkart obtenu par synthèse expérimentale à partir du croisement de *B. madritensis* L. par *B. sterilis* L. *Bull. Soc. Bot. France* 84(9/10): 711-713. 1937 (rec'd 6-8-38).—The double cross (*Bromus madritensis* × *sterilis*) × *sterilis* has given a single plant whose characters are identical with those of a spontaneous example of the hairy form of *B. sterilis*, which the author called in 1931, with Miss Camus, × *Bromus fischeri* f. *persterilis*, and which other authors have named *B. sterilis* var. *velutinus*. The synthesis of this form is, then, realized by this cross.—E. L. Core.

68. FUNK, GEORG. Über die Nachkommenschaft einer weissbunten Eiche (*Quercus robur*, albi-*viridinervis*). *Beih. Bot. Centralbl. Abt. A* 58(1/2): 151-163. 12 fig. 1938.—The offspring of a white-variegated, green-nerved oak (*Q. robur* var. *albiviridinervis*) were studied as to their variability. The oak seedlings used were produced without protection from cross pollination by normal greenleaved oaks growing near by. 71% of the offspring were normally green, 21% were white-variegated to different degrees and in different patterns. The epicotyls of the white-variegated seedlings were at first intensively red (anthocyanin) colored but this disappeared when the leaves unfolded. The most evident character, the green veins, appeared in only a few (2% at most) of the seedlings. A yellow variegation to various degrees appeared in 2% of the seedlings. The color in the chlorophyll-free areas of their leaves was present, not as carotinoids in plastids, but as a pale yellow sap. The midsummer growth of the variegated seedlings in the first year bore mostly normal green leaves, in the 2d year the majority of the white-variegated seedlings came out at first with normally green or only slightly white-variegated leaves while the midsummer growth then again produced more strongly variegated leaves. The normal green-leaved seedlings made very strong growth again in the 2d year and attained 2 to 3 times the height of the white-variegated seedlings. In natural rejuvenation they would accordingly quickly suppress the white-variegated forms.—*Auth. summ.* (tr. by H. F. Bergman).

69. GLEMEROTH, G. Beiträge zur Genetik der Weizenqualität. [The genetics of quality in wheat.] *Jour. Landw.* 86(2): 89-113. 1938.

70. GYÖRFFY, B., und G. MELCHERS. Die Herstellung eines fertilen, amphidiploiden Artbastardes *Hyoscyamus niger* × *H. albus* durch Behandlung mit Kolchizininlösungen. *Naturwiss.* 26(33): 547. 1938.—The species hybrid *H. niger* ($n=17$) × *H. albus* ($n=34$) is sterile ($2n=51$). The growing points of 24 hybrids were treated with colchicine (0.5-0.25%, 2-3 treatments). 9 plants showed enlarged pollen and were fertile. 102 chromosomes were found in their seeds. The original cross produced also a sterile hybrid with $2n=68$ due to the fertilization of an unreduced egg cell of *H. niger*.—G. Sander.

71. GYÖRFFY, B. Durch Kolchizinbehandlung erzeugte polyploide Pflanzen. *Naturwiss.* 26(33): 547. 1938.—Growing points of diploid seedlings of *Petunia nictaginiflora*, *Epilobium alpinum*, *Hyoscyamus niger*, *Linum usitatissimum*, *Antirrhinum majus*, and *Capsicum annuum* treated with colchicine (0.5-0.01%, 2-3 applications) produced enlarged pollen grains and, in the first 4 spp., tetraploid seeds. The production of a tetraploid flax is considered to be of economic importance.—G. Sander.

72. HESSE, R. Vergleichende Untersuchungen an diploiden und tetraploiden Petunien. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 75(1): 1-23. 1938.—From a line of *Petunia axillaris* inbred for 5 generations, a tetraploid plant was obtained by pollinating it with pollen of *Salpiglossis*. The tetraploid plant produces many fewer branches than the diploid. The cotyledons and vegetative leaves have significantly lower length/breadth indices in the tetraploid. The size and extent of the colored spots on the corolla are greater in the tetraploid. The volume of epidermal cells and pollen grains is greater in the tetraploid. The majority of the pollen grains in the diploid are 3-pored; in the tetraploid 4-5 pored. There is no difference in chloroplast size. The development from seed to flower takes 3-5 days less in the diploid than in the tetraploid.

The increase in both fresh and dry weight of tetraploid plants grown in culture solution is not significantly different from that of the diploids. The water content of the tetraploids is significantly higher and the osmotic value of the cell sap correspondingly lower in the tetraploid than in the diploid. The fertility of the tetraploid was high.—G. L. Stebbins, Jr.

73. HUTCHINSON, J. B., V. G. PANSE, N. S. APTE, and B. M. PUGH. Studies in plant breeding technique. III. Crop analysis and varietal improvement in Malvi Jowar (*Andropogon sorghum*). *Indian Jour. Agric. Sci.* 8(2): 131-152. 1938.—The importance of investigation of crop analysis is emphasized and the so called "unit species" method of Pusa is criticized, its mechanical aspect being pointed out. Snowden's classification of sorghum is considered inadequate as it does not take into account the range of crop populations from a genetic standpoint. Supplementary trials of residual material from progeny rows is considered desirable in retaining valuable material in bulk.—B. S. Kadam.

74. IMAI, Y. Flaked flowers of *Chrysanthemum* and *Pelargonium* due to unstable self-coloured genes. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 74(3/4): 519-521. 1938.—Flaked stocks of Matsunami chrysanthemum have genes that mutate recurrently from magenta to white. Inbreeding of this stock gave no magenta, 14 flaked, 98 white offspring. No reverse mutation was observed. A similar gene in *Pelargonium* mutates from red to pink. Offspring from this stock gave a monogenic segregation for red and pink. Both flaked stocks are regarded as periclinal chimaeras.—G. L. Stebbins, Jr.

75. JONES, DONALD F. Translocation in relation to mosaic formation in maize. *Proc. Nation. Acad. Sci. U. S. A.* 24(5): 208-211. 1938.—Somatic changes in maize endosperm result from deletion and translocation, not from somatic crossing over. Translocations are reciprocal, more or less at random among all the chromosome arms, and may result in single or paired changes exhibiting the removal of dominant genes from the aberrant sectors.—D. F. Jones.

76. KUCKUCK, H. Untersuchungen über Koppelung bei *Antirrhinum majus*. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 75(1): 24-54. 1938.—By determining crossover percentages between each pair of genes involved, the position of 11 genes on the uni chromosome was determined as follows. *Anitida-Argentea-Unicolor* 15.5 units; *Uni-Chlorina-Dichotoma* 11.9 units; *Dich-Compacta* 7.26 units; *Comp-Pallida* 10.88 units; *Pal-Analata* 7 units; *Ana-lethal-Serpentina* 16.4 units; *Serp-Parviflora* 4.2 units. Total 73.14 units. 3-locus studies show that the coincidence is strikingly low. The only 3 locus study showing a high coincidence is *Uni-Dich-Pal* in which both segments involved are near the middle of the chromosome.—G. L. Stebbins, Jr.

77. MEDVEDEVA, G. B. Perekrestnoe opylenie kendirya. [Hybridization of *Apocynum venetum*.] [In Russ.] *Sovetskaya Botanika* [Soviet Botany] [Leningrad] 1937(6): 115-125. 1938.

78. MICHAELIS, P. Über die Konstanz des Plasmons. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 74(3/4): 435-459. 1938.—Lehmann's opinion, that reciprocal differences obtained by the author in *Epilobium* hybrids (described in earlier papers) are due to the action of genically controlled hormones, is refuted by the following evidence. In inter-racial hybrids of *Antirrhinum* slight reciprocal differences are found which manifest themselves at various stages of development. Furthermore, *E. hirsutum* in *luteum* plasma (Lh^{33}) grows more rapidly than typical *hirsutum* (Hh^{33}) at 13-20° C, and more slowly at 0-5° C, while Lh^{34} grows more slowly than Hh^{34} with 10-hour periods of illumination, more rapidly with 24-hour periods. Lehmann's discovery that races of *E. hirsutum* differ in genes that affect degree of hybrid development is confirmed; these same races differ in the amount of inhibition caused by their plasma. The *hirsutum* race (Jena) which produces the most vigorous hybrids in *luteum* plasma produces the poorest ones in its own plasma. The opinion of Wettstein, that the differences between the plants of the various back-cross generations, Lh^{33} , and true *hirsutum* are due to the heterozygosity of the former, is refuted by the following evidence. The cross *luteum* ♀ × (Lh^{33} × *hirs.* ♂) ♂ gives a significantly higher pollen fertility than *luteum* ♀ × (*hirs.* ♀ × Lh^{33} ♂) ♂. Furthermore reciprocal differences are found in the cross

luteum \times *Lh'* both in fertility and organ size, indicating that the plasma of *Lh'*, though simulating that of *E. luteum*, is not exactly the same. Finally efforts to isolate lines from *Lh'* plants which differed in the fertility produced by them in the cross *Lh''* \times *lutea* failed, indicating no segregation of genes for this fertility. The plasma is considered to be a constant structure. The observed changes in the plasma of back cross generations are considered to be due to mixing of different plasmas rather than to changes in the units of the plasma.—G. L. Stebbins, Jr.

79. MOEWUS, FRANZ. Vererbung des Geschlechts bei Chlamydomonas eugametos und verwandten Arten. *Biol. Zentralbl.* 58(9/10): 516-536. 1938.—The races and species of the *C. eugametos*-group (*C. braunii*; *C. dresdensis*; *C. eugametos typica*, *simplex*, *synoica*, *subheteroica*; *C. paupera*) differ in type of sex-determination and in valency of the gametes. *C. braunii* is heteroecious and has genotypic sex-determination; the gametes are very strong with valence 4 (on an arbitrary scale based on the genetic analysis). *C. dresdensis* is synoecious with phenotypic sex-determination; the gametes are strong (valence 3). *C. e. typica* and *simplex* are heteroecious with genotypic sex-determination. The gametes of *typica* are strong with valence 3. The valence in *simplex* is 2. *C. e. synoica* is synoecious with phenotypic sex-determination; the gametes are weak with valence 1. *C. e. subheteroica* is subheteroecious; the gametes are weak with valence 1. The genetic factors which condition female-ness (*F*) and male-ness (*M*) are not alleles; the crossover value is 3.08%. The pure heteroecious forms have either *F* or *M*; the synoecious forms have both *F* and *M* in equal valence. The constitution of the \varnothing subheteroecious forms is *FMTm*; that of the corresponding σ is *FMTf*. The crossover value between *M* and *t* is about 9.8%. The complex heteroecious forms possess *F* and *M* in different valence, but the one of stronger valence is epistatic over the weaker one. The complex forms have a reduced viability. The general results are similar to those obtained on *Polytoma* and *Protosiphon* and form the genetic basis for a solution of the problems of relative sexuality.—A. H. Hersh.

80. PROPACH, H. Cytogenetische Untersuchungen in der Gattung Solanum sect. Tuberarium IV. Tetraploide und sesquidiploide Artbastarde. *Zeitschr. Indukt. Abstamm.- u. Vererbungsl.* 74(3/4): 376-387. 1938.—In the hybrid *Solanum acanule* ($2n=48$) \times *S. antipoviczii* ($2n=48$) 0-5 univalents, 14-24 bivalents, 0-3 trivalents and 0-5 quadrivalents are found. This is interpreted, on the basis of comparison with autotetraploid *Lycopersicon esculentum*, as indicating near autopolyploidy, except for the fact that 5% of the sporocytes show chromatin bridges, indicating that the 2 parents differ by one or more inversions. The hybrids *S. chacoense* ($2n=24$) \times *S. tuberosum* ($2n=48$) had the somatic number $2n=48$ (7 plants) indicating that an unreduced egg cell of *S. chacoense* had been fertilized. At meiosis only bivalents with one occasional quadrivalent are formed. Some plants of this hybrid are sterile, due to causes other than cytological ones.—G. L. Stebbins, Jr.

81. RAUNKIAER, C. The barrenness percentage in castrated and non-castrated Taraxacum flowers. *Botaniske Studier* 5. 383-398. 1937.—The author records the results of expts. made a number of years ago in connection with his castration expts. He was interested as to whether the sterile fruits in the castrated heads had been originally adapted for fertilization, but he found they also occurred in non-castrated heads. Various expts. made threw no light on the question. The results of the expts. showed great variation in the occurrence of sterile fruits, both in castrated and in non-castrated heads. Generally, there seemed to be more of a tendency to sterility in the non-castrated than in the castrated ones, which the author explains as follows. Competition for food is keener in non-castrated than in castrated heads, because part of the food has already been used in the formation of floral parts, while that part of the food has largely been saved in the castrated heads. More weak flowers will therefore succumb in the non-castrated than in the castrated heads. Raunkiaer believes that the large number of species within *Taraxacum* is due to the occurrence of species in which fertilization is necessary, e.g., the Japanese species *T. platycarpum*.—H. E. Petersen.

82. STEPHENS, J. C., and J. R. QUINBY. Linkage of the Q B Gs group in sorghum. *Jour. Agric. Res.* 57(10): 747-757.

1 fig. 1938.—A sorghum linkage group of 3 factor pairs, *Qq* (reddish and blackish plant color), *Bb* (presence and absence of nucellar layer), and *Gsgs* (normal green and green-striped plants), was studied in the F_2 coupling phase. The observed order of genes and cross-over percentages were *Q* (13.2) *B* (11.1) *Gs*. This linkage group was independent of the factors *Ss* (presence and absence of spreader), *Rr* (colored and white seed), *Aa* (awnless and awned lemmas), *Dd* (dry and juicy stalks), *Rsr*s (red and green seedling stems), *Alal* (normal and antherless flowers), *V2v2* (green and virescent yellow seedlings), and *Tsts* (twin-seeded and single-seeded spikelets).—J. C. Stephens.

83. STOUT, A. B. The genetics of incompatibilities in homomorphic flowering plants. *Bot. Rev.* 4(6): 275-369. 21 fig. 1938.—A review dealing with the main classes of incompatibilities, the theory of oppositional factors and the personate type of incompatibility, incompatibility in *Nicotiana*, *Trifolium pratense*, *Antirrhinum*, and *Petunia*, the *Capella* and the associate types of incompatibility, polyploidy and incompatibilities, and selection and self-compatibility.—L. Benson.

84. TAVCAR, A. B. Vererbungsart der Spindelstufenzahl bei Bastardierungen einiger distichum \times vulgare Wintergersten. *Zeitschr. Indukt. Abstamm.- u. Vererbungsl.* 75(1): 106-123. 1938.—In 3 series of crossings between 2-rowed (*distichum*) \times 4-rowed (*vulgare*) barley the F_2 ratios were 1-2-1 of 2-rowed, intermediate (lateral kernels half as large as central one), and 4-rowed types. The average number of nodes on the rachis of 3 lines of *H. distichum* during the 3 years 1934, 1935, 1936 varied from 28.174 to 31.027; in *H. vulgare* the range was 20.013-24.186. Variance was 6.015-8.014 for *distichum*, 9.32-10.636 for *vulgare*. The F_1 were intermediate; in the F_2 the plants segregating for 2 rows (*ZZ*) had an average of 28.812 nodes, the intermediate (*Zz*) types had an average of 26.404 and the *zz* types 21.606. The figures for variance for these 3 were 12.151, 11.688 and 15.555. Node number, therefore, is linked with row number, and both show monofactorial inheritance. By an indirect method the crossover percentage was estimated to be 39.2424. Selected *ZZ* F_2 types with a low node number and *zz* types with a high internode number produced F_3 and F_4 generations with nearly the same number of internodes as their F_2 parents, although there was a slight but significant regression toward the mean accompanied by a reduction in variance. The economic value of 4-rowed barley with many internodes is pointed out.—G. L. Stebbins, Jr.

85. TORRES, JUAN P. Results of citrus hybridization in the Philippines. *Philippine Jour. Agric.* 9(2): 161-176. 1938.—Matings of intraspecies vars. show that cross-compatibility between vars. is the rule in citrus. Interspecies matings are cross-compatible to a certain extent, depending on the vars. used. Specific instances of cross-compatibility between some vars. of different spp. are found in the matings of Siamese 3442, Chinese pomelo, Kishiu mandarin, Lui Gim Gong orange, Daidai, and Tahiti lime as seed parents with Rough lemon and in the direct and reciprocal crosses of Siamese 3442 and Siamese 3673 with Kishiu and Calamondin (*Citrus microcarpa*).—M. Manresa.

ANIMAL (EXCEPT MAN)

86. ALEXANDER, GORDON. Observations on hybrid flickers in Colorado. *Jour. Colorado-Wyoming Acad. Sci.* 2(4): 27. 1938.—Examination of 57 apparent hybrids between *Colaptes auratus* and *C. cafer* collected in Colorado tends to confirm Deakin's theory of dominance of yellow quill color, red nuchal band, and gray throat. The data suggest, in contrast to Deakin's theory, dominance of red over black in the malar stripe. Multiple factors are involved.—G. Alexander.

87. BAUER, HANS, M. DEMEREC, and B. P. KAUFMANN. X-ray induced chromosomal alterations in *Drosophila melanogaster*. *Genetics* 23(6): 610-630. 1938.—Chromosomal rearrangements were studied by salivary chromosome analysis of 1765 F_2 larvae obtained from untreated $\varnothing\varnothing$ mated to X-rayed $\sigma\sigma$. A total of 1038 breaks were plotted within the limits of single divisions of Bridge's map. The data show (1) the frequency of breaks increases with the dosage; (2) a significant deviation from the straight line proportionality between dosage and frequency of breaks; (3) breaks are distributed at random throughout

the euchromatic regions, with the possible exception of distal sections when breaks tend to be slightly more frequent; (4) breaks are more frequent in heterochromatic than in euchromatic regions of similar salivary chromosome lengths; (5) breaks are distributed at random among chromosomes of comparable lengths; and (6) 2 breaks are independent of each other.—*Authors.*

88. BUCHMANN, W. Über die Wirkung der Temperatur auf den Mutationsprozess bei *Drosophila melanogaster*. IV. Die Wirkung von Temperaturschocks auf die Entwicklungsdauer von *Drosophila melanogaster*. *Zeitschr. Indukt. Abstamm.- u. Vererbungs.* 74(3/4): 465-471. 1938.—By means of temp. shocks of 35° for 24 hours and 38° for 8 hours the time of development, from egg laying to emergence of flies, was lengthened from 10.12 days in controls kept at 25° to 11.81 when larvae of 4 days were given the 35°, 24-hour shock, but only to 10.56 and 10.96 days respectively when 7 and 8 day larvae or pupae were treated with the same shock. Normally ♀ flies hatch slightly earlier, on the average, than ♂, but temp. shocks applied at 5 and 6 days cause ♂ to hatch 0.1 and 0.55 days earlier than the ♀. The effect of 38° shocks is similar but more marked, and there is less difference between ♀ and ♂ flies when shocks are applied at the 6 day stage.—*G. L. Stebbins, Jr.*

89. BUCHMANN, W., und N. W. TIMOFEEFF-RESOVSKY. Über die Wirkung der Temperatur auf den Mutationsprozess bei *Drosophila melanogaster*. V. Nicht-erbliche Modifikationen, ausgelöst durch Temperaturschocks in verschiedenen Entwicklungsstadien. *Zeitschr. Indukt. Abstamm.- u. Vererbungs.* 74(3/4): 472-478. 1938.—By applying temp. shocks of 35° and 38° to normal, inbred, wild stocks of *D. m.*, a small number of abnormalities were produced repeatedly. These were abnormal abdomen, abnormal eye formation, short legs, the 9 wing modifications: club, crumpled, unequal, incisae, miniature, curly, divergens, plexus, narrow, and the bristle modifications minute and reduced. Each of these appeared in maximum percentage at some definite stage of larval development. In the case of the abdomen, eye, and the first 5 wing abnormalities these maxima were not marked, but they were particularly evident in the cases of miniature, curly, divergens, and minute. The maxima for miniature and minute appeared after treatment of 5-6-day larvae; those for curly and divergens upon treatment of 7-8-day pupae.—*G. L. Stebbins, Jr.*

90. GOTTSCHESKI, G., und J. B. BUCK. Weitere Transplantationsexperimente an *Drosophila melanogaster* und *D. pseudoobscura*: das Gen Clot. *Zeitschr. Indukt. Abstamm.- u. Vererbungs.* 74(3/4): 460-464. 1938.—Eye-disks of *D. pseudoobscura* of the constitution *v(p)* and *or(p)*, and eye-disks of *D. melanogaster* of the constitution *v(m)*, *cn(m)*, *v cl(m)* and *cn cl(m)* were transplanted into *p(p)* or *pr(p)* larvae of *D. pseudoobscura*. In both cases the non-autonomous developing *v(m)* implants were more vermilion-like than *v(p)* or *v cl(m)*. *cn(m)* implants were clearly different from *or(p)* and *cn cl(m)*. The *v(m)* and *cn(m)* implants apparently need less *v+* and *cn+* substance if they are combined with *cl(m)* in homozygous condition. If combined with *cl(m)* they act identically with *v(p)* or *or(p)*. The authors conclude that the gene *cl(m)*, or a gene homologous to *cl(m)*, is present in *+(p)* and in the eye-mutants of *D. pseudoobscura*. The difference in the amount of *v+* and *cn+* substance needed is explained by the different constitution of the granules in *+(m)*, *+(p)* and *cl(m)* (HS-test). In *v cl(m)* implants the *cl*-pattern is maintained; *cn cl(m)* implants do not show it. It is assumed that the pattern of distribution of pigment is shifted from *cl(m)* to *+(m)* by the addition of *cn+* substance. *v cl(m)* implants, however, must react with the *v+* substance first and therefore indicate a time differential of development in comparison with *v cn(m)* implants.—*W. Braun.*

91. HASKINS, C. P., and E. V. ENZMANN. On a characteristic somatic modification induced by adverse environmental conditions in *Drosophila*. *Jour. New York Ent. Soc.* 46(4): 453-455. 1938.—Adverse environmental conditions, notably partial starvation, prolong the larval life of *Drosophila*. In a large percentage of flies reared from starved larvae a characteristic somatic modification "blistered eyes" appears.—*C. P. Haskins.*

92. HILL, J. BEN. Variations in the spotting character of "pinto" horses. *Proc. Pennsylvania Acad. Sci.* 12: 33-35.

1 fig. 1938.—European geneticists have postulated 2 types of spotting in horses, one dominant in heredity, the other recessive. Observation of "pinto" horses indicates that the spotting character is exceedingly variable. Variability is possibly due to the action of modifying factors conditioning distribution or restriction of color.—*J. Ben Hill.*

93. HOOVER, M. E. Cytogenetic analysis of nine inversions in *Drosophila melanogaster*. *Zeitschr. Indukt. Abstamm.- u. Vererbungs.* 74(3/4): 420-434. 1938.—Points of exchange and specific bands deleted in salivary chromosomes are given exactly, except for 3 cases of uncertainty of a single line for the following inversions: Cl B, A M, dl-49, D, and 5 others, induced in the X chromosome by Demerec. Bridges' 1938 map was used as a basis. A parallel study was made in inversion/+ heterozygotes of crossing over and of the frequency of synapsis at all points in the salivary chromosome. The frequency of complete synapsis at a given point of exchange ranges from 54% to 86%.—*E. Dempster.*

94. LEBEDEFF, G. A. Intersexuality in *Drosophila virilis* and its bearing on sex determination. *Proc. Nation. Acad. Sci. U. S. A.* 24(4): 165-172. 1938.—Genetical, morphological and embryological (gonads only) studies of intersexes [see B. A. 10(8): entry 17756] indicate that they start to develop as ♀♀ and then from certain stage, known as the turning point, proceed to develop in a ♂ direction. However, these intersexes differ morphologically from those of *Lymantria* and *D. melanogaster* by being essentially hermaphrodites because of the peculiarity in the development of those sexual organs whose imaginal discs had not become fully differentiated at the time of reversal. Such organs continue to develop as ♀ organs, but along with them ♂ organs appear presumably from fresh outpushings from the imaginal discs. The development of gonads is somewhat different. After the occurrence of the "turning point" ♀ germinal cells in the ovaries are gradually transformed into ♂-like ones. The ovary itself is not transformed into a testis, except in very early reversals, but it buds out a testis-like organ, to which are confined some of the oöcytes now transformed into spermatocyte like cells. The bearing of these studies on the sex determination in general, and in *Drosophila* in particular, is discussed.—*G. A. Lebedeff.*

95. LERNER, I. MICHAEL, and V. S. ASMUNDSON. Genetic growth constants in domestic fowl. *Poultry Sci.* 17(4): 286-294. 1938.—Schmalhausen's growth constants, based on the postulate that rate of growth is inversely proportional to the elapsed time, were computed on Warren's data for cross-bred fowls and on data for Leghorns and Rocks. By the use of such constants evidence of sex-linkage in the Red X Leghorn cross made by Warren is adduced. Differences in growth constants between breeds and strains and between sexes are demonstrated, thus confirming our previous reports. The decreased early growth rate exhibited by later hatches within breeds is found to lead to compensatory growth in later stages. Differences in early growth rates between breeds reflected the differences in adult weight. Definitive weights within breeds are found to be independent of the differential patterns of growth in the early stages.—*Auth. summ.*

96. SCHWARTZ, V. Über die Vererbung des Ausprägungsgrades der Schwarzen Querbindezeichnung auf dem Vorderflügel von *Ephestia kühniella* Z. *Zeitschr. Indukt. Abstamm.- u. Vererbungs.* 74(3/4): 409-419. 1938.—3 stocks of *E. k.* (*Kl II 1*, *Rk Mn* and *Kl V 3*) are analyzed in regard to the expression of their proximal and distal black bands (*P_I*, *D_I*, and *P_{II}*, *D_{II}*) in wing pattern. *Kl II 1* and *Rk Mn* differ in one sex-linked and one autosomal gene in regard to the expression of their bands. Crosses of *Kl II 1* and *Kl V 3* show the action of 3 genes for 3 bands (*P_I*, *D_I* and *D_{II}*). This is the first time that the action of genes on separate elements of one pattern-system was observed.—*W. Braun.*

97. WATERS, N. F. The influence of inbred sires top-crossed on White Leghorn fowl. *Poultry Sci.* 17(6): 490-497. 1938.—The crossing of highly inbred White Leghorn ♂♂ with random-bred White Leghorn ♀♀ improves fertility and hatchability of the eggs and viability of the chicks. Crossing good inbred strains of poultry with random-bred strains suggests a method of increasing fertility and hatchability and of lowering the mortality in the domestic fowl during the first 6 months of the growing period.—*N. F. Waters.*

ECOLOGY

Editors

W. C. ALLEE, *Terrestrial Animal Ecology*
G. D. FULLER, *Terrestrial Plant Ecology*
CHANCEY JUDAY, *Hydrobiology (Oceanography,
Limnology)*

FREDERICK A. DAVIDSON, *Ecology of Wildlife
Management—Aquatic*
W. L. MCATEE, *Ecology of Wildlife Management—
Terrestrial*

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Island life, 34; Beavers as geologic agents, 166; Longevity and food abundance, Daphnia, 431; Aggregation effects, goldfish, 434; Forest succession and deer browsing, 1300; Fungus-engraver beetle symbiosis, 1428; Insect populations, Kansas, 1487; Rodent, flea community under controlled conditions, 1514; Robber flies (Asilidae) of Colorado, 1622; Gall-midge associates, 1625. [PLANT ECOLOGY]: Cliff vegetation, France, 1163; Soil organic matter and climate, 1218; Root systems of coffee, 1239; Hardiness of tree and shrub spp., 1286; Root system, Pinus silvestris, 1312; Photoperiodism, 1378)

GENERAL

103. ALEXANDER, GORDON. The principle of the relative optimum in ecology. *Jour. Colorado-Wyoming Acad. Sci.* 2(4): 29. 1938.—The concept of absolute optimum, while valuable in studies of a single variable, does not simplify our analysis of biotic and physical environmental factors in nature. With many simultaneous variables, the optimum condition of a given factor is relative to the other factors present. Recognition of the principle of the "relative optimum" should simplify analysis of community integration.—G. Alexander.

104. BAY, JAMES WILLIAM. Glacial history of the streams of southeastern Michigan. *Cranbrook Inst. Sci. [Bloomfield Hills, Michigan] Bull.* 12. 1-68. Folding map, 3 pl., 11 fig. 1938.

105. BENNETT, H. H. Emergency and permanent control of wind erosion in the Great Plains. *Sci. Month.* 47 (5): 381-399. Illus. 1938.

106. COSTER, I. C. Bovengrondsche afstrooming en erosie op Java. [Surface run-off and erosion in Java.] [With Eng. summ.] *Landbouw* 14(8/9): 457-572. Illus. 1938.

107. FROHNE, W. CARRINGTON. Contribution to knowledge of the limnological rôle of the higher aquatic plants. *Trans. Amer. Microsc. Soc.* 57(3): 256-268. 1938.—Six species of aquatic sedges and a reed commonly thought to support few or no insect feeders, were found to possess a fauna of 50 spp. in the region of Douglas Lake, in northern Michigan. 94% of the insects belong to the orders Coleoptera, Lepidoptera, Diptera, and Hymenoptera. Nearly half are phytophagous, the remainder include parasites and scavengers. The injuries caused by the insects are largely the result of severance of the vascular tissue in stems and leaves by the construction of mines, galleries, gallery-mines and the abnormal cell growth in galls. Aquatic adaptation is illustrated only to a slight degree in the reed-rush insects. Hibernation in the larval stage within the food plant is common.—L. R. Wilson.

108. HOPKINS, J. W. Agricultural meteorology: correlation of monthly precipitation in central and southern Alberta and Saskatchewan with latitude, longitude and altitude. *Canadian Jour. Res. Sec. C, Bot. Sci.* 16(5): 214-224. 1938.—The linear partial regression coefficients of the 19-year average (1917-1935) monthly precipitation recorded at 42 points in central and southern Alberta on latitude, longitude and altitude were detd. for each month of the year. The correlation of precipitation with these co-ordinates, although statistically significant, was only moderate. Some improvement was effected by inclusion of the quadratic term in longitude, but even so, more than 50% of the inter-station variance of the 19-year precipitation averages for most months remained in the form of residual deviations. Observations for individual years were even less amenable to graduation. Consequently, a given number of meteorological stations would provide a much less complete specification of precipitation than of air temp. (the subject of a parallel previous study) within the area considered.—Auth. abst.

109. MONSON, O. W. Need for research in the field of hydrology. *Northwest Sci.* 12(2): 26-31. 3 fig. 1938.—This is a brief review of past achievements with suggested lines for future research in the field of hydrology in its broader sense, including hydrography, hydrography, hydrogeology, and hydrometeorology.—F. V. Rand.

110. THOMAS, H. A. The determination of the meteorological conditions of the atmosphere by the use of radio-sounding balloons. *Proc. Roy. Soc. [London] Ser. A.* 167 (929): 227-250. 11 fig. 1938.—Previous methods of atmospheric exploration by radio-sounding balloons are reviewed. Arrangements involving radio frequency variations are unlikely to be satisfactory due to the wide frequency band required and the possibility of appreciable interference. In the original method described, a signal of fixed radio frequency is employed, and each meteorological instrument produces a continuous variation of modulation frequency. The pressure- and temp-measuring instruments are arranged to produce variation of modulation frequency without mechanical linkages. The cost of the apparatus is said to be comparatively low, and reproduction in large quantities possible. The results from a number of exptl. ascents are analyzed as showing great reliability and accuracy. Observation of pressure and temperature up to ± 10 km. altitude is obtained, the accuracy of these determinations being ± 5 mb. and 1° C, respectively.—F. V. Rand (courtesy Exp. Sta. Rec.).

ANIMAL

111. BLAIR, W. FRANK. Ecological relationships of the mammals of the Bird Creek region, Northeastern Oklahoma. *Amer. Midl. Nat.* 20(3): 473-526. 12 fig. 1938.—The Bird Creek region of NE Oklahoma is intermediate in position and climate between the eastern deciduous forest and the Great Plains grasslands, and is, therefore, part of an area that is neither predominantly grassland nor forest. The communities of the region are related in part to those of the east in the eastern deciduous forest and tall-grass prairies, and in part to those of the west in the Great Plains grasslands. The local distribution of the communities is controlled by edaphic factors, and periods of drought aid in restricting the extent of forest associations. Of the 31 spp. of mammals known from the region, 6 range over most of N. America; 3 are widely distributed in western N. America; 12 have the eastern deciduous forest as their area of greatest abundance, 4 the Great Plains grasslands, 3 the Gulf Coastal plain, one the tall-grass prairies, one boreal N. America, and one the desert mountain ranges of the southwestern U. S. As a rule the spp. of mammals occupy in the Bird Creek region communities similar to those they occupy in their respective areas of greatest abundance, but some occur outside of their own association types. These latter also extend beyond the geographic limits of their own association types, and in so doing tend to be modified into different races.—W. F. Blair.

112. BODENHEIMER, F. S. Problems of animal ecology. vi+183p. Illus. Oxford University Press: New York, 1938. Pr. \$4.—Chapter I—Physiological and ecological life-tables and connected problems—deals with life-intensity and age structure of animal populations and the relation between ecological ages. II—The life-history and its ecological interpretation today—summarizes data on the physical ecology of the life cycle; life cycles of coccinellid beetles in Palestine; applications of the climograph; "bonitation" in the Mediterranean fruit fly; sense ecology and behavior. III—What really occurs in the *Drosophila* bottle?—presents a further approach to a complete population analysis, with new data concerning the population growth of a Palestinian species of *Drosophila*. IV—Biological equilibrium in nature and biological control—is concerned with a discussion of the relative importance of biotic as contrasted with climatic control. V—Is the community a dynamic or a static con-

ception?—is a discussion in which the author favors the 2d alternative. Chapter VI—The interaction of environment and heredity within the organism—stresses the inadequacy of present genetic theory to explain animal relations in nature and is admittedly a plea for an unprejudiced approach to the problems that find one explanation in the Lamarckian theory.—*W. C. Allee*.

113. MARSHALL, A. J. Bird and animal activity in the Arctic. *Jour. Animal Ecol.* 7(2): 248-250. 1938.—Contrary to common opinion some arctic spp., as the arctic tern (*Sterna macrura*), have periods of quiescence in the perpetual arctic light, although these periods are affected by weather conditions. Other spp., as the fulmar petrel (*Fulmarus glacialis*), lack these periods and possibly rest only after feeding or when tired.—*S. C. Kendeigh*.

114. SCHEFFER, THEO. H. Study of a small prairie-dog town. *Trans. Kansas Acad. Sci.* 40: 391-395. 1937(1938).—An ecological study made in the upper Solomon valley in Kansas, including diagrams of burrows.—*F. C. Gates*.

PLANT

115. ALBERTSON, F. W. Prairie studies in west-central Kansas. *Trans. Kansas Acad. Sci.* 41: 77-83. 5 fig. 1938.—The prairies of west-central Kansas are usually composed of 3 general types of vegetation. The short-grass (*Buchloe-Bouteloua*) type constitutes about 30% of the area and is found capping the nearly level uplands. The little bluestem (*Andropogon scoparius*) type is well distributed over the hillsides and makes up 60% of the prairie. The remaining 10% is composed primarily of big bluestem (*A. furcatus*) and is found in the lowlands. The average annual rainfall at Hays, Kansas (1868-1937) was 22.67 inches. For the 5-year dry period (1933-1937) it was only 16.2 inches. During the drought, soil moisture was seldom available to plant use below 2 feet in the short grass type and only occasionally in the upper 24 inches, resulting in enormous losses of vegetation. Meter quadrats staked out and charted in the short grass before the drought and every year since indicate no great difference in ground cover existed before the drought on ungrazed and grazed prairies but in the fall of 1937 they ranked 23% and 4% respectively. Weedy forbs were also greatly increased as a consequence of overgrazing. Little bluestem and wire grass (*Aristida purpurea*) are found widely scattered throughout the short grasses during wet cycles, but upon the advent of drought they retreat to the hillsides. Even in the ungrazed little bluestem type along the hillsides tall grama (*Bouteloua curtipendula*) and big bluestem have gained at the expense of the little bluestem. Grazing only makes the situation worse. Here there is a great increase in the number of species of unpalatable forbs. Dust blown from cultivated fields probably causes greater damage than overgrazing.—*Author*.

116. BAUER, JOHANNA. Beiträge zur Physiologie der Ruderalpflanzen. *Planta* 28(3): 383-428. 8 fig. 1938.—An ecological study of the flora of the city dump of Leipzig-Moekern. The nitrate content of the site corresponds to that of good soil. There was not much $\text{NH}_4\text{-N}$. Nitrates are stored in mature plants in decreasing amounts in the following species: *Amarantus reflexus*, *Chenopodium album*, *Atriplex nitens*. Such high storage of nitrate may also occur in plants of other localities—*Impatiens noli tangere*, *I. parviflora*, *Heracleum spondylium*. In sand cultures the following species endured high nitrates: *Amarantus retroflexus*, *Atriplex nitens*, *Hyoscyamus niger*; less so *Fagopyrum esculentum*. It is suggested that plants thriving on the dump are better able to endure As in the soil, perhaps also an overbalance of Mg during dry spells. The dump plants are also considered preferentially able to put out new roots after the end of a dry spell. *A. retroflexus*, *Ballota nigra*, *Hyoscyamus niger* and *Solanum dulcamara*, are not obligate dump dwellers.—*B. R. Nebel*.

117. BÖCHER, TYGE W. Biological distributional types in the flora of Greenland. A study on the flora and the plant-geography of South Greenland and East Greenland between Cape Farewell and Scoresby Sound. *Meddelelser om Grønland* 106(2): 1-340, 2 pl. 1938.—The work contains the flora of an area recently investigated by the 7th Thule Expedition under the leadership of Dr. Knud Rasmussen (1933). The flora comprises 391 vascular plants. An account

is given of 1) their taxonomy, variation, and cytogenetics, 2) geographical distribution outside of Greenland, 3) geogr. distr. in Greenland, 4) occurrence in SE Greenland, 5) ecology, and 6) life-forms. Under (3) more than 100 maps are given of the spp. within Greenland. Some maps showing the total distribution of a few specially interesting species (*Polygala serpyllacea*, *Juncus squarrosus*) are added. The distribution of the plants is on the basis of climatic conditions. The climate is discussed and isotherms for January and July, and isohyets, are inserted on a number of maps. The winter isotherms and isohyets show a more northerly course in E. Greenland than in W. Greenland; the summer isotherms lie farthest north in W. Greenland, bending northward towards the interior of the country; some summer isotherms exhibit an oblong-circular course and remain in the interior of the country right at the edge of the inland ice (e.g., the 10° July-isotherm). The many maps show plants whose northern limits occur farthest north in E. Greenland (southern-oceanic); and plants whose northern limits occur farthest north in W. Greenland towards the interior of the country (southern-thermophilous plants). Some spp. spread inland at their southern limit and extend farthest south in W. Greenland (northern-continental), while others extend farthest south in E. Greenland and seem to prefer the cold outer coast (northern-psychrophilous). Other types of distribution are also found. The flora is thus divided into a number of biological distributional types mentioned above. The extent to which other conditions may have determined the present limits of the spp. is discussed. Where historical and edaphic conditions seem to be the most important causes of the distribution of the plants, the biological distributional type of the particular plant cannot be further elucidated. The biological types of distribution are used to illustrate various phytogeographical conditions. The greater number of eastern spp. are oceanic, while the majority of western spp. are continental or thermophilous. The distributional types are further used, like Raunkiaer's life-forms, in a characterization and classification of plant communities, for which purpose they are regarded as well suited. The phytogeography is treated in a special chapter. The area is divided into zones and sub-zones on the basis of the floristic results (areal limits, frequency limits) and the distribution of the plant communities. A subarctic, a low-arctic, and a high-arctic zone occurred, each with certain subzones. The close conformity between this division of E. Greenland and Trapnell's division of W. Greenland rendered it possible to prepare a preliminary survey of the phytogeographic zones of Greenland. The number and frequency of the eastern and western spp. are discussed, and also the problem of time of immigration of the flora and the survival of the flora during the ice-ages, especially during the latest ice-age. The author's views may be summarized as follows: In S. and E. Greenland there is a large eastern flora element, which in certain regions plays a greater rôle in the vegetation than the western element. These regions seem to belong to the European flora region, because of a climatic agreement between northwestern Europe and these parts of Greenland. Nearly 100% of the Greenland flora may be supposed to have survived the latest ice-age in Greenland. According to Wegener's theory it may be supposed that during the latest interglacial period (and before) considerable exchange of species took place between N. America and Europe. That even the subarctic spp. may have survived the latest glaciation in Greenland is supported by observations of the flora in relict localities in E. Greenland and by the present natural conditions of SE Greenland, which in many places have a glacial character.—*T. W. Böcher*.

118. DAVIES, WILLIAM. Vegetation of grass verges and other excessively trodden habitats. *Jour. Ecol.* 26(1): 38-49. 1938.—These habitats have a good deal in common as measured by the zonation of the vegetation found associated with them. Under lowland conditions in Britain *Lolium perenne*, *Trifolium repens* and *Poa annua* appear to be the most abundant spp. found on the more heavily trodden part of the road verge or pathway. Under conditions of lower soil fertility, such as those normally associated with heather and other moorland vegetation, the most abundant constituents of the road verge habitat are

Agrostis tenuis, *Poa annua* and the fine-leaved fescues.—*Auth. summ.*

119. DUTRO, RUTH, and EDITH COHOE. An ecological study of Wolf's Bog, Cheboygan County, Michigan. *Trans. Kansas Acad. Sci.* 41: 87-95. Map, 4 fig. 1938.—A discussion of the ecological status of this bog developed in a kettle-hole depression of the late Wisconsin glaciation. Due to fire and erosive activities, the lake has been completely exterminated by vegetation and the vegetation itself is beginning to pass from typical bog associations to upland associations.—*F. C. Gates.*

120. FREDRICKSEN, MORTON T. Comparison of the environment and certain physiological activities of alfalfa and prairie vegetation. *Amer. Midl. Nat.* 20(3): 641-681. 7 fig. 1938.—A comparison of the environment, growth and water loss in upland prairie and an adjacent field of alfalfa was made at Lincoln, Nebraska, during the growing seasons of 1935 and 1936. Soil moisture reserves were almost exhausted at the beginning of the exp.; precipitation was 3 inches below the normal 28 inches the 1st year and 14 inches below the 2d. Available soil moisture was greater in the prairie at all depths during both years. Average day air temps. were nearly identical in the 2 habitats, but average maximum day temps. were slightly higher in the prairie. Average day soil temps. were consistently higher in the alfalfa field. During periods of extreme heat, vapor pressure deficits were 2 to 32 mm. greater among the rolled and folded foliage of drought-resisting prairie grasses than among the more deeply rooted and more mesic cultivated legumes. Wind movement was greater in the field, and evaporation was markedly greater both among the plants and above them. A new type of phytometer containing native sod was devised for the study of water usage by grasses. They were 2.5 feet deep and had a surface area of one-half square foot. Allowing both transpiration and surface soil evaporation, and being surrounded entirely by undisturbed native vegetation, they permitted determination of actual water usage. Phytometers of alfalfa were likewise completely surrounded by field plants of alfalfa. The average daily water loss per square foot of soil was 89 pound in prairie and 1.35 lbs. in the field during 1935, and 1.15 and 2.17 lbs. in the same sequence during 1936. Water usage per gram of dry matter produced was 1,296 and 1,233 g. in prairie and alfalfa, respectively, during 1935, but 2,684 and 2,498 g. during the following summer. Yield per acre from the field of alfalfa during 1935 was 3,840 lbs., from prairie 3,510 lbs. Corresponding yields for the drought year were only 1,920 and 1,459 pounds. The greater yields of alfalfa were at the expense of excess water of both soil and subsoil, which were thoroughly dried.—*J. E. Weaver.*

121. GIBB, DOROTHY C. The marine algal communities of Castletown Bay, Isle of Man. *Jour. Ecol.* 26(1): 96-117. 2 fig. 1938.—The author found 15 communities distinctive of the different types of habitat, e.g., rock, sandy mud-covered rock, pebbles, sand and pools. The *Porphyr-Urospora-Ulothrix* community, the *Laurencia-Lomentaria* community, the *Laurencia-Cladophora-Rhodochorton* community and *Enteromorpha-Cladophora-Chordaria* community have not been previously recognized. The communities described are all perennial except, the *Porphyr-Urospora-Ulothrix* community and the *Enteromorpha-Cladophora-Chordaria* community, the former occurring only in winter and spring and the latter in spring and summer. Many of the perennial communities, however, include so many annual and short-lived spp. that the composition of any community is usually undergoing changes. This is best illustrated in the case of the *Laurencia-Lomentaria* community. The communities which exhibit least seasonal change are (1) the *Laminaria* community, and (2) the community hanging under ledges, the composition of which remained remarkably constant throughout the year. The horizontal distribution of the vegetation in the area is chiefly influenced by the degree of exposure to wave action. The vegetation in the southern, more exposed, part of the area differs noticeably from the northern, more sheltered, part. Several communities are restricted to the southern part, e.g., the *Himantalia* community, the *Laurencia-Lomentaria* community and the *Porphyr-Urospora-Ulothrix* community, while those occurring on movable sub-

strata such as sand or pebbles are confined to the most sheltered northern part. The effect of exposure is also very marked in the size and development of spp. of Fucaceae, such as *Ascophyllum* and *Fucus vesiculosus*, which occur throughout the whole area. Owing to the large tidal range and gentle slope many of the communities cover large areas of shore. In the north of the area the slope is gentlest and such communities as the *Enteromorpha* community, the sublittoral community on pebbles and the *Laminaria* community occupy very large intertidal areas strewn with sand, pebbles and boulders. In these gently sloping places the boundaries of the communities are not nearly so clearly defined as on the steeper ground towards the south.—*Auth. concl.*

122. [GODWIN, H. et al.] Data for the study of post-glacial history. *New Phytol.* 37(4): 329-332. 1938.—It is suggested that preliminary papers on this subject be published in the *New Phytologist* and that some uniformity of diagrams be observed. Various types of organic muds known as "dy" and "gyttja" are discussed and defined.—*G. D. Fuller.*

123. JAESCHKE, J. Zur nacheiszeitlichen Waldgeschichte der Rhein- und Saarpfalz. (Ein ergänzender Nachtrag zur Untersuchung der rheinpfälzischen Moors.) *Beih. Bot. Centralbl. Abt. B* 58(2): 235-242. 2 fig. 1938.—The Jägersburg moor is considerably younger than the moors of the lowlands of the Rhine-palatinate which Firbas investigated. The pollen spectrum, from the close of the oak-mixed forest-alder period, corresponds so closely with those descr. by Firbas that the forest development, which as here found was entirely of the beech period, must have been similar to that of this period in the Landstuhl moors. The Wurzelbach moor of the Saar-palatinate began its development as a moor still later as the oak-mixed forest-alder period is absent and the beech period is already advanced, as shown by the occurrence of hornbeam. The pollen spectrum of this moor, aside from the locally conditioned over-representation of alder, also coincides with that of the synchronous part of the Jägersburg profile. It is therefore probable that the pollen deposits of the older strata would be similar to those of the Jägersburg moor and further also to those of the moorlands of the (Rhine) palatinate. The most recent forest development here disclosed agrees best in its oak-alder phase with that of the Landstuhl moors, the pollen spectra of which are supplemented by those here described.—*Auth. summ. (tr. by H. F. Bergman.)*

124. MARTIN, N. MARY. Some observations of the epiphytic moss flora of trees in Argyll. *Jour. Ecol.* 26(1): 82-95. 1 fig. 1938.—This district offers a favorable habitat for mosses owing to the cool winds and heavy rainfall. The mosses upon various spp. of trees were studied, special attention being paid to oaks, since they appear to form natural woodland and also because the moss upon them is evidently affected by exposure. On sheltered trees the moss and lichen covering was heavy on trunk, branches, and even small twigs, and showed marked zonation. As exposure to the prevailing winds increased the moss covering became scantier, its zoning much less marked, and the vertical extent of the zones much reduced. The lowest zone on sheltered trees consisted of moss-carpet species, the middle zones of *Eurhynchium myosuroides*, *Hypnum cupressiforme* and *H. cupressiforme* var. *filiforme*, and the top zone of pioneer species such as *Uloa crispa* and *Pylaisia polyantha*. A comparison of trees on which the mosses were zoned with those on which they were not showed that the mosses most commonly found on the latter were pioneer spp., e.g., *Uloa* and *Pylaisia*. A correlation of zonation with exposure showed that all sheltered trees, and less than half the exposed trees were zoned. The results obtained for ash and other trees of which fewer individuals were examined confirmed those obtained for oak. The moss covering of ash trees was not on the whole so dense as that on oaks. Pioneer spp. appeared in lower zones than on oaks. Some study was made of the autecology of some of the most frequently encountered spp. A comparison was made of the commonest mosses growing on oak, ash, birch, and sycamore, and it was shown that the pairs oak and birch, ash and sycamore, behaved differently. The differences were accounted for chiefly by differences in the roughness of

the bark, chem. differences playing only a small part.—*Auth. summ.*

125. MÜLLER. Jurské smrčiny. (Srovnávací typologická studie.) [Spruce forests of the French Jura: comparative typology.] [With Fr. summ.] *Lesnická Práce* 17(7/8): 418-430. 3 fig. 1938.—An analysis of the vegetation of the various subtypes of the spruce forests of the French Jura.

126. NELSON, E. W. Natural rehabilitation of abandoned cropped lands. *Jour. Colorado-Wyoming Acad. Sci.* 2(4): 23. 1938.—After 6-10 years valuable perennial grasses begin to appear on abandoned crop lands in Colorado. Under present conditions of grazing it probably requires 80-100 years to restore the original grama grass vegetation cover.—*F. Ramaley.*

127. PITT-SCHENKEL, C. J. W. Some important communities of warm temperate rain forest at Magamba, West Usambara, Tanganyika Territory. *Jour. Ecol.* 26(1): 50-81. Map. 1938.—On the basis of a 10% strip survey in the Shuma-Magamba forest reserve, the ecology of the warm temperate rain forest is considered. Other terms used to designate this type of forest are "subtropical evergreen forest," "mountain rain forest," "temperate rain forest," and a number of others. The altitude of the Magamba area varies from 5300 to 7600 feet. The climate is moist with a rainfall of 50-65 inches, with 2 main wet seasons, Nov. to early Jan., and March to June. Frosts are frequent in the valleys during the winter. The soils are grey-brown, yellow-brown, or dark-brown loam, with a reddish subsoil. In some they are characterized by a podsol condition, "tropical forest podsols" of Milne, and in others they are similar to the "brown forest soils" of Europe. This is supposed to be due to the parent material, the "acidic" gneiss developing a podsol and the basic or neutral gneiss into brown forest soils. The forest is composed of broad-leaved evergreens, even the conifers having relatively broad leaves. The dominant trees, except for small areas of heath, swamp, and "secondary forest," are camphor. The sub-dominant and 2d story trees vary greatly from place to place. 26 communities of varying ecological rank are recognized and described. Although they are based for the most part on "ground flora" and "undergrowth" differences there are corresponding differences in dominant and co-dominant tree species and may therefore be considered as forest types. Their recognition may be helpful in forest practice.—*S. A. Graham.*

128. QUANTIN, A., et G. NÉTIEN. Aperçu sur quelques associations végétales des Alpes de l'Oisans. *Bull. Soc. Bot. France* 85(3/4): 159-165. 1938.—A phytogeographical study of the region including lists of the more important species observed in each of the different physiographic situations encountered.—*P. D. Strasbaugh.*

129. SIMPSON, J. F. HOPE. A chalk flora on the Lower Greensand: its use in interpreting the calcicole habit. *Jour. Ecol.* 26(1): 218-235. 1 pl. 1938.—A small area, referred to as the calcareous sand, was found on the Lower Greensand in Surrey, within 1 km. of the chalk, bearing a herbaceous flora closely resembling that of chalk grassland. Only 8 of the 45 spp. of constancy 3 or over, recorded by Tansley & Adamson for chalk grassland, were absent from this flora. The soil contained chalk intimately mixed with the sand; it was probably scattered on the land for agricultural purposes more than 50 years ago. An adjacent area on typical acid greensand soil, bearing a vegetation of the same general type as the calcareous sand, and subject to more or less similar physiographic and biotic conditions, was studied in order to use it as a rough "control experiment." The soils of the calcareous sand and acid sand areas hardly differ significantly in mechanical analysis fractions; they are both quite distinct from chalk grassland soil in this respect, but the calcareous sand is similar to it in pH and the possession of free chalk. Therefore comparison of the flora of the calcareous sand with that of chalk grassland on the one hand, and of the acid sand (supplemented by other greensand records) on the other, affords a means of studying the respective importance of physical and chemical soil factors in determining the calcicole and calcifuge habit in a few of the species of the chalk and of the greensand respectively. For the vast majority of chalk grassland species the factors determining the calcicole habit are evi-

dently chemical. This is in agreement with the view commonly held. It has been possible to group some of the species into the following classes: (1) Calcicoles determined by chemical soil factors such as *Avena pubescens*, *Bromus erectus*, *Helianthemum vulgare*; (2) Calcifuges determined by chemical soil factors: e.g., *Calluna vulgaris*, *Deschampsia flexuosa*; and (3) Calcifuges determined by physical soil factors: e.g., *Plantago coronopus*, *Saxifraga tridactylites*. The available data do not make it possible to consider the very hypothetical class of "physically determined calcicoles." *Avena pratensis* is the most important chalk grassland species absent from the calcareous sand. A simple wilting exp. indicated that for grassland vegetation drought is a more serious problem on the Folkestone beds on the Lower Greensand than it is in similar situations on the chalk.—*From auth. summ.*

130. STUBER, EMIL. Blattanatomische Untersuchungen an einigen Xerophyten der Walliser Felsensteppe. Beitrag zur Erkenntnis der ursächlichen Entstehung xeromorpher Merkmale unter Berücksichtigung der ontogenetischen Blattentwicklung. *Beih. Bot. Centralbl. Abt. A* 53(1/2): 1-150. 14 fig. 1938.—In addition to the adjustments enumerated which are produced in response to the xerotherm habitat, there also are developed, in the association in which the species belongs, through the influence of the biocoenose, special anatomically-morphologically characterizable structural types (the so-called special adaptations) which are sharply delimited from the leaf modifications of the same plant from habitats outside of this association. These adaptations are restrictive phenomena the entrance of which into the ontogenetic development may be recognized, and a comparison of the developmental stages of the adapted form of all habitats with one another on the one hand with the developmental stages of the primary form on the other hand shows how these restrictive phenomena with increasing xeric influence clearly act upon the structure of the organ. The habitat restricts the development of the leaves to an extent typical for each habitat and thus causes the familiar undersized forms of the leaves which in this case are to be considered as inhibited forms. The final question of the inheritability of these inhibited forms is negated by the fact that transplanting exps. of xerophytic plants from the most xerothermic habitats to more mesophile locations brings a change in type and broad leafedness, which result is obtained also by sowing seeds.—*From auth. summ. (tr. by H. F. Bergman.).*

131. WATT, A. S. Studies in the ecology of Breckland. III. The origin and development of the Festuco-Agrostidetum on eroded sand. *Jour. Ecol.* 26(1): 1-37. 6 fig. 1938.—The origin and development of a *Festuco-Agrostidetum* is described from an area of infertile sand. For the most part the species are the same in the different stages of the succession. *Polytrichum piliferum* is important as pioneer and accumulator of blown sand, lichens are fairly numerous and 2 of them, *Cetraria aculeata* and *Cladonia silvatica*, play leading parts, while higher plants are few, the most important being *Festuca ovina* and *Agrostis alba* and *A. tenuis*. The spp. of *Agrostis* behave in the same way and are considered together. Where there is richness in annual plants in keeping with the poverty of the soil only the least exacting species—*Aira praecox* and *Teesdalia nudicaulis*—are found. There is no continuous progression up the inclined plane of seral development from the simple to the more complex community with a corresponding increase in soil organic matter, but each stage consists of a series of progressive and retrogressive phases separated by a peak stage. The succession in short is wave-like or cyclic. The early stages occur at the foot of eroding dunes where an erosion pavement checks further removal of sand. Marginal invasion by *Polytrichum piliferum* leads to its dominance and sand accumulation. There follow stages dominated by *Cetraria aculeata*. Under the mat of mixed *Cladonia-Cetraria*, *Polytrichum* dies and the mat disintegrates in whole or in part, exposing the soil to partial or complete erosion down to the erosion pavement. On the erosion pavement the cycle begins again. Further development of the vegetation is conditioned by the presence of higher plants. *Festuca* and *Agrostis* become established vegetatively (*Festuca* in favorable seasons by seed) in the

bare stage from surviving parts brought down from the eroding bank. Their influence is local, that of *Festuca* being confined to a narrow ring round the tuft, that of *Agrostis* to the patch of soil it occupies. At this stage of development the crest of the wave consists of patches of *Agrostis* in a mat of *Cladonia*; set in a background of *Cladonia-Cetraria* studded with scattered *Festuca*. The crest of the next wave is also patchy: patches of abundant *Agrostis* and relatively few *Festuca* are set in a background with few *Agrostis* but many *Festuca*. Both have an almost continuous carpet of *Cladonia*. The crest of the late stage is an intimate mixture of abundant *Agrostis* and numerous but small *Festuca* again set in a carpet of *Cladonia*. None of these peak stages is stable; the *Agrostis* dies in whole or in part and the lichen carpet disrupts, leaving the soil open to erosion. The relationships between *Festuca* and *Agrostis* are described for each of the 3 stages. Where *Agrostis* invades a lichen community with *Festuca*, *Cladonia* becomes dominant and the number and size and therefore the total area covered by *Festuca* decreases. The cover per cent of *Festuca* in communities with abundant *Agrostis* tends towards 2.5. There is in each main stage a progression towards this apparent equilibrium which fails of achievement because the community disintegrates before it is reached. While a series of dry years speeds up retrogression relatively to progression both stages exist side by side. Periodicity is inherent in the vegetation itself and connected in some way with the lichen cycle. The primary cause remains obscure.—*Auth. summ.*

132. WEST, OLIVER. The significance of percentage area determinations yielded by the percentage area or density list method of pasture analysis. *Jour. Ecol.* 26(1): 210-217. 1938.—The percentage area method is discussed. The difficulty of using estimated percentage area results for the detection of change in pasture or grassland is pointed out. Although a strong correlation exists between the estimations made by different observers on the same quadrat, each observer estimates differently and the results of several observers cannot be compared until reduced to the same scale. It is proposed that the measurements of area covered made by means of a pantograph be used as a constant scale, that all observers correlate their estimations with pantograph measurements at regular intervals and that they reduce all estimated percentage area results to the pantograph scale. In deciding on the significance of change shown in results obtained by different observers at different times, it is necessary to reduce all observations to the same scale, to compute the standard deviation of the difference of the means, and to compare the difference with its standard deviation, or with the derived value, the probable error.—*Auth. summ.*

133. WILLIAMS, THOMAS. Ecology of the black forest. *Jour. Colorado-Wyoming Acad. Sci.* 2(4): 24. 1938.—The "black forest" is an eastward extension of the foothill forest upon the high plains of Colorado. Western yellow pine dominates the hilltops, scrub oaks the sheltered slopes, and grasses the lowlands. A high water table probably explains the presence of pines in this plains area.—*F. Ramaley.*

OCEANOGRAPHY

134. ALLEN, W. E. The Templeton Crocker Expedition to the Gulf of California in 1935—the phytoplankton. *Trans. Amer. Microsc. Soc.* 57(4): 328-335. 1938.—This paper gives the results of study of 134 catches of phytoplankton taken in Nov., a season not before represented in the region. Although Nov. 1935 appeared to be a poorly productive month farther north, a considerable abundance (more than 100,000 cells per liter) was found at one station in the Gulf. As at other seasons in other years the region near Abasco Point on the Pacific side of the Peninsula showed greater productivity. The genera and spp. of diatoms recorded in the Gulf were also found in the neighboring ocean although the numbers of both were notably smaller.—*W. E. Allen.*

135. LILICK, LOIS C. Preliminary report of the phytoplankton of the Gulf of Maine. *Amer. Midl. Nat.* 20(3): 624-640. 1938.—The results of a survey of the Gulf of Maine for the period between Sept. 1933 and Sept. 1934 are presented mainly in tabular form. A complete list of the

spp. found, along with their seasonal occurrence, is presented in 3 tables. 34 tables illustrate the quantitative distribution of phytoplankton and protozoa at representative stations from the different regions of the Gulf, at all seasons, and at varying depths. A map showing the positions of these stations is included. No discussion of these data is presented here.—*L. Lillick.*

LIMNOLOGY

(See also in this issue Entries 431, 1071)

136. LACKEY, JAMES B. The manipulation and counting of river plankton and changes in some organisms due to formalin preservation. *U. S. Publ. Health Repts.* 53(47): 2080-2093. 6 fig. 1938.—All of the protistan forms in 266 samples of Scioto River (Ohio) water were obtained by centrifuging each sample, and 100 were studied and counted without killing, the remainder after preservation in 5% formalin. Since no larger forms were present, organisms were counted in a drop of water beneath a cover glass, no counting chamber being used. A definite ratio, 1 drop equaling 1, 2 or 4 ml. of raw river water, and counting of several drops at either 125 or 537 diameters gave an accurate determination of species and numbers present. Tables are given showing the checks on this method, and a detailed table is appended showing changes in 237 spp. of protozoa after formalin preservation, with suggested diagnostic characteristics.—*J. B. Lackey.*

137. NEEDHAM, JAMES G., and PAUL R. NEEDHAM. A guide to the study of fresh-water biology with special reference to aquatic insects and other invertebrate animals and phyto-plankton. 4th ed. revised and enlarged. 89p. 24 pl., 7 fig. Comstock Publishing Company, Inc.: Ithaca, N. Y., 1938. Pr. \$1.—A systematic guide to the plants and animals of fresh water with keys and figures, and outlines for 23 studies of special habitats.—*C. A. Kofoed.*

138. RICKER, WILLIAM E. On adequate quantitative sampling of the pelagic net plankton of a lake. *Jour. Fish. Res. Bd. Canada* 4(1): 19-32. 1938.—Of the various kinds of error which arise in quantitative plankton investigations, those involved in the enumeration of a collection are ordinarily smallest, though fractioning may introduce an extra sampling error, particularly when not done volumetrically. More serious are the possibilities of error in the collection of the plankters from the lake. Traps are in general more accurate than nets, but the latter are more convenient, and when made of no. 10 silk are reliable quantitative collectors of the larger organisms. The more usual no. 20 silk is very variable in efficiency. Both nets and traps appear to suffer from the ability of some plankters to see and avoid them, by day. The sampling error of a collection, considered as representing the part of the lake near which it was taken, is such as to make a single collection, containing only a moderate number of individuals, of little value in determining abundance of a species. On Culus Lake [British Columbia], collections taken at a single central station will indicate the average abundance of the pelagic plankton almost as precisely as would the same number of collections taken at various points throughout the whole pelagic region.—*Auth. abst.*

139. RICKER, WILLIAM E. Seasonal and annual variations in quantity of pelagic net plankton, Culus Lake, British Columbia. *Jour. Fish. Res. Bd. Canada* 4(1): 33-47. 1938.—Intermittently over a 13 year period the net plankton of Culus Lake has been sampled, at a central representative station. Net plankton was not particularly rich in common spp. Of the entomostracans important as fish food, only 4 occurred. Seasonal distribution of the various spp. is of 2 principal kinds: unimodal, with one peak of abundance in late spring or summer—various green algae, Protozoa, Rotatoria, Cladocera and *Epischura*; and bimodal with peaks in early spring and in autumn—diatoms, mostly Rotatoria and *Cyclops*. Among bimodal spp. the spring maximum is ordinarily the greater. Marked differences in abundance of a plankter occur from year to year and affect both the maximal numbers attained and duration of time of proliferation. The available data do not show these annual changes to be cyclic and no definite correlation with environmental conditions has been made. The total N

content of net plankton varied from 2 to 10 mg. per l. in 1932, the dry weight from 30 to 210 mg.—*Auth. abst.*

140. SAUBERER, F., und O. ECKEL. Zur Methodik der Strahlungsmessungen unter Wasser. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 37(4/5): 257-289. 13 fig. 1938.—Selenium rectifier photo-electric cells must be used with proper allowance for curvature of the intensity-current relation as influenced by resistance of the current meter. They cover the range u.-v. to near infra-red. Jena glass filters were used, but measurements by difference, such as between GG2 and GG3 are condemned. Transmission was studied in 10 spectral bands, using, singly or combined, UG 1, BG 12, VG 9, BG 18, OG 2, RG 1, RG 2, RG 5, RG 8, RG 9, 2 mm. thick, also NG 5, 3 or 4 mm. to reduce intensity non-selectively. Filters were carried on a revolving disc. No diffusing filter was used, save in the measurements of diffusely reflected light from the lake and from a meadow. The influence of various depths of water in shifting the center of gravity of the band transmitted by the filters is discussed, also that of the spectral sensitivity of the cell. With a completely overcast sky the reflection from the lake is only slightly greater in the red than in the green and blue, about 3-5% in each. From a meadow 35% of the deep red is reflected, falling to 1-2% about 630 m μ , rising to 6% in the green and falling to about 1% in the violet. With clear sky and sun at altitudes from 10° to 39°, almost uniform spectral reflection for high altitudes was replaced by a marked increase in the reflection of the longer wave lengths at 20°, rising to about 44% for 720 m μ at 10°. In the Lunz lower lake about 2.5% of the green light reached 20 m., and this amount of blue was found at 9 m., of red at 7.5 m., of u.-v. at about 2.5 m., and of infra-red at less than 2 m. Estimates are given for the energy, in mg. cal./cm.²/min. reaching 1, 5 and 10 m. in spectral bands 50 m μ wide.—*W. R. G. Atkins.*

WILDLIFE MANAGEMENT—AQUATIC

(See also the section "Pisces"; and Entry 1556)

141. ALLEN, K. R. Some observations on the biology of the trout (*Salmo trutta*) in Windermere. *Jour. Animal Ecol.* 7(2): 333-349. 1938.—From a study of scales, mean annual growth was found to remain nearly constant throughout life, at about 7 cm. per year. The majority of young fish enter the lake from the streams where hatched when 2 years old. The fish grow most rapidly during the summer time, and their relative weight is greatest during period of most rapid growth. From Oct. to Feb. the trout feed on the permanent bottom fauna, from Mar. to July on the temporary bottom fauna, and from May to Sept. on the surface food. Trout over 40 cm. long feed largely on smaller fish. The trout population of the littoral region is estimated at 12 per 40 m. shore line, of which 50% are in their 3d year, 25% in their 4th.—*S. C. Kendleigh.*

143. CARRUTHERS, J. N. Fluctuations in the herrings of the East Anglian autumn fishery, the yield of the Ostend spent herring fishery, and the haddock of the North Sea—in the light of relevant wind conditions. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 107: 10-15. 2 fig. 1938.—The percentage of 3-year-old herring in the East Anglian fishery varied as varied the pressure gradient controlling run of wind up the Southern Bight from the Straits of Dover during Dec. and Jan. of the season in which each year class was spawned. This relationship held for the data from 1923-24 to 1933-34. The Belgian spent herring catch showed an inverse relation. The pressure gradient measures the increased flow of air from the English Channel, which in its turn produces an increased flow of Channel water. This in its turn distributes the herring spawn more widely and more quickly sweeps the spent herring along the Belgium coast and away from the Ostend fishery. The amount of survival of haddock spawn varied as the pressure gradient, implying wind from the southeast quadrant during March, April and May, and east components in wind during Feb.-May. These wind forces and directions were measured for certain regions of the North Sea.—*F. N. Clark.*

144. ERDMANN, WILHELM. Ein Beitrag zur Rassenfrage beim schottischen Frühjahrshering. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions*

107: 31-36. 4 fig. 1938.—A sample of 200 herring taken at 56° N. and 1° E. in Oct., 1935, analyzed as to maturity, age, growth rate, and vertebral count, consisted of 23% fall herring and 73% spring herring. The spring herring showed the same racial characters as herring of the same age-class taken in the Firth of Forth and on Fladen Ground and studied by Wood. This confirms Wood's conclusion that herring from the northern North Sea may come as far south as the Firth of Forth and raises further questions about the distribution of herring in the North Sea.—*F. N. Clark.*

145. FLEMING, F. A. A survey of small lakes as game fish retaining ponds in the Medicine Bow National Forest. *Jour. Colorado-Wyoming Acad. Sci.* 2(4): 30. 1938.—In Oct. the lakes were stocked with small black spotted and brook trout which were collected at weekly intervals from the following June into Sept., weighed, measured and stomach contents examined. The growth increase was 50%. The food consisted of 80% by count of amphibiotic insect larvae, chiefly Chironomidae, Ephemerida and Plecoptera. Coleoptera, Hymenoptera, Diptera, Hirudinea and Crustacea were eaten also. The water space, 1.1 cubic meters per fish, was adequate.—*E. D. Crabb.*

146. GILSON, G. Variation of year-classes in an annual concentration of fish. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 107: 37-41. 2 fig. 1938.—The percentage strength of each year-class of spent herring appearing each season in the intermediate region between the English Channel and the North Sea was measured for 8 seasons. In each season except 1937-38, each year-class has had a higher percentage value in its 2d season in the fishery. The 1933 year-class entering as 3-year-olds in 1936-37 declined in relative numbers in 1937-38. This reversal of percentage strength is attributed to internal organic conditions of the 1933 year-class and not to ecological changes which should affect the entire population.—*F. N. Clark.*

147. GRAHAM, M. Phytoplankton and the herring. III. Distribution of phosphate in 1934-1936. [*Gr. Brit.*] *Min. Agric. and Fish. Fish. Invest. Ser. II* 16(3): 1-26. 1938.—Patches of *Rhizosolenia styliformis* of sufficient extent and density to be a bar to herring attempting to reach the usual grounds are formed when the conditions are those associated with strong Atlantic influx. The principal patch of the Southern part of the North Sea is commonly located in the South-west Dogger Bank Swirl, which is nourished with phosphate from deeper water of the Northern part of the North Sea, in the summer, when the rest of the Southern North Sea may be expected to be without phosphate, as it was in 1934.—*M. Graham.*

148. HICKLING, C. F. Notes on the biology of the Cornish pilchard. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 107: 26-28. 1 fig. 1938.—Maximum feeding occurs from April to July with a secondary increase in Oct. Maximum gonad development is in April to June. Average weight is greatest in July and Dec. to Jan. Fat content fluctuates as does weight. Water and ash content vary inversely with fat content. The residue, presumably mainly protein, reaches a maximum in Oct. and a minimum in March.—*F. N. Clark.*

150. OGILVIE, HELEN S. The food of post-larval haddock with reference to the annual fluctuations in the haddock broods. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 107: 57-66. 1938.—Of larvae collections made in 1934 and 1935, 70% of the food consisted of copepods nauplii, 20% of adult copepods, copepodids and copepod eggs. The remainder comprised early stages of euphausiids, larval mollusks and microplankton. Empty stomachs were few. Nauplii counts of the plankton indicated the number in the environment under normal conditions is more than sufficient. The uniformity of the food showed that selection was made even by very young larval stages.—*F. N. Clark.*

151. PRATT, HAROLD PARKER. Ecology of the trout of the Gunnison River, Colorado. *Univ. Colorado Stud.* 26 (1): 114-118. 1938.—The food habits of the rainbow (*Trutta shasta*) and brown trout (*T. fario*), the principal trout of the Gunnison, differ in the upper and lower portions of the stream, chiefly because the large stone-fly, *Pteronarcys californica*, is absent in the upper portion. *Pteronarcys* has a 3-year life cycle, an adult age-group emerging each June. Other important food insects are species of caddis-flies, may-

flies, and diptera. *Cladophora* is eaten by the rainbow trout. The detailed analysis of food habits was based upon careful examination of about 500 stomachs.—*G. Alexander.*

152. RAE, BENNET B. Lemon sole larvae in Scottish waters during 1931. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 107: 42-48. Map. 1938.—The greatest number of larvae of *Pleuronectes microcephalus* were taken at the bottom or 100 meters. More larvae were found at the surface at night. Larvae were taken in numbers in the southern part of the region in May. In June, productive hauls were made north to the Shetland Islands. Larvae were found from May to Sept. The larval distribution confirms other indications of the widespread spawning habit of the lemon sole.—*F. N. Clark.*

153. REINWALDT, EDW. Salmon-markings in Esthonia and the results obtained up to the present date. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 107: 29. 1 fig. 1938.—In 7 years, 1565 fish were marked and 7 recovered. Three were taken at marking locality and 4 near the southern coast of Finland.—*F. N. Clark.*

155. RITCHIE, ALFRED. Preliminary observations on the food of the plaice (*Pleuronectes platessa*) in Scottish waters. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 107: 49-56. 1938.—Stomach contents vary with size of fish, locality and season and in general reflect the food available. Annelids constitute an important source of food in all localities. Many echinoderms, mollusks and fish, chiefly sand eels, are also eaten.—*F. N. Clark.*

156. SUND, OSCAR. Die Norwegische Seefischerei. *Handbuch Seefisch. Nordeuropas* 8(1 a): 1-181. 210 fig. 1938.—Fishing is the 3d most important industry in Norway, from Lofoten northward it is the most important industry. The cod (*Gadus morhua*) are taken mainly at Lofoten and Møre during spawning migrations, at from 8 to 12 years of age, with a size range from 70 to 100 cm. Long lines are the important gear at Lofoten and gill nets at Møre. Winter herring (*Clupea harengus*) are taken during inshore winter migrations, and range in size from 30 to 34 cm., with the 5- to 13-year age groups predominating. The fishery is centered south of Statt and Bergen. Ring nets and gill nets are used. It was the almost complete disappearance of this group from 1875 to 1905 that caused many fishery investigations to be inaugurated. The spawning spring herring replaces the winter herring along the coast during Feb. and Mar. and are taken mainly around Stavanger and Hangesund. This group is composed of individuals up to 5 years old. They are taken in gill nets, beach seines and some ring nets. The brisling or sprat fishery (*Clupea sprattus*) is centered at Stavanger, where 1- or 2-year-old individuals are taken in the protected fjords with ring nets and trap nets. The legal season is from May to Jan. Of lesser importance, but still the most frequently used fresh fish along the Norwegian coast is *Gadus virens*. These fish are taken by submerged baited traps, mainly in the summer as they migrate along the coast. This species matures at 5 years of age and at a length of 60 cm. Herring and cod represent $\frac{3}{4}$ of Norway's fishery industry, but regular fisheries exist for many other species. Among them: halibut (*Hippoglossus vulgaris*), salmon (*Salmo salar*), haddock (*Gadus aeglefinus*), tuna (*Thunnus thynnus*) and mackerel (*Scomber scomber*). In addition to the coastal fisheries, Norwegians are engaged in the Iceland, North Sea and Davis Strait areas, and especially on the many banks off the northern Norwegian coast. Of increasing importance during the last decade has been the shark and skate fishery. Important are the herring shark (*Isurus cornubicus*), spur dog (*Squalus acanthias*), ice shark (*Somniosus microcephalus*), *Raja batia* and *R. clavata*. The fisheries are well regulated and supported by governmental agencies. In 1935, 921,000 tons of fish were landed, having a value of 77 million Kronen.—*S. R. Hatton.*

157. TESCH, J. J. Observations on the herring population in the Flemish Bight and the eastern part of the Channel in the winter 1937-38. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 107: 21-25. 4 fig. 1938.—Average length decreased slightly as compared to the previous season. Four-year-olds were below average in abundance as well as 3-year-olds. Vertebral counts indicate that the "threes" belonged to the Downs herring type. The "fours" appeared to comprise both Downs and Channel

herring. Maturity studies indicated that in Oct. the population was of the Downs type, changing to the Channel type in Nov. or Dec. In Jan., a mixture of the 2 races seemed evident. Growth rate is subject to question due to selection by drift nets.—*F. N. Clark.*

158. WHITE, H. C., and A. G. HUNTSMAN. Is local behaviour in salmon heritable? *Jour. Fish. Res. Bd. Canada* 4(1): 1-18. Map. 1938.—Fry from Atlantic salmon [*Salmo salar*] taken in Chaleur bay, near the mouth of the Restigouche river, NB., where the salmon enter early in the summer and mainly as 2-sea-year and 3-sea-year fish, were planted in 1932 in the East branch (without salmon) of the Apple river at the head of the bay of Fundy. In this region the local salmon enter only in the autumn and nearly all as 1-sea-year fish (grilse). The Restigouche fish as parr grew more rapidly than the local fish, corresponding with the less crowded conditions in the East branch. The smolts were marked by removal of the adipose fin when descending to the sea in 1934. Their descent occurred from May 12 to June 20, being markedly accelerated by rainfall. Traps were placed on both branches in 1935, giving in the autumn 92 marked grilse entering the East branch and 6 the South. The traps in 1936 gave in the autumn, 5 marked 2-sea-year salmon entering the East branch and 1 the South. No difference in appearance or behavior was observable between these and the local salmon of the South branch.—*Auth. abst.*

159. WICKLIFF, EDWARD L. Additional returns from fish tagged in Ohio. *Trans. Amer. Fish. Soc.* 67: 211. 1937 (1938).—106 returns from fishermen for gill-tagged wild Lake Erie breeder fish and hatchery fingerlings released in the streams of Ohio, show that 37% of the fish moved 10 miles or less; 20%, 11-25 miles downstream; 26%, 26-50 miles downstream; 12%, 51-100 miles downstream, and 5%, 100-205 miles with the current. The fish taken by fishermen included 35 smallmouth bass [*Micropterus dolomieu*], 28 channel catfish [*Ictalurus l. lacustris*], 25 rock bass [*Ambloplites rupestris*], 14 bullhead catfish [*Ameiurus n. nebulosus* and *A. m. melas*], 3 largemouth bass [*Huro salmoides*], and 1 carp [*Cyprinus carpio*].—*E. L. Wickliff.*

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 59, 784, 1300)

160. BENNITT, RUDOLF, and WERNER O. NAGEL. A survey of the resident game and furbearers of Missouri. *Univ. Missouri Stud.* 12(2): 1-215. 10 maps, 8 fig. 1937.

161. CHARD, J. S. R. Birds, animals and afforestation. *Scottish Forest. Jour.* 52(2): 96-102. 1938.—Notes on the change in bird and mammal population following afforestation of heath land in Scotland. Most of the original spp. of birds tend to disappear, and their place is taken by a larger number of other spp. by the time the forest reaches pole stage (about 20 yrs.). The original spp. of mammals generally remain, and many others come in as the forest affords cover.—*W. N. Sparhawk.*

162. CORDIER-GONI, PAUL. Les Castors en Suède d'après une étude de M. Lars Faxen (1935). *Bull. Soc. Nat. Acclimat. France* 84(11/12): 270-274. 1937(rec'd 3-13-38).—In 1880 the beaver was wild in Norway but not in Sweden. Its limits were east, the coast south-west of Wolden and Drangedal; west, the river Mandal; north, the river Verije in the Telemarken. About 1911 (probably on account of protection) it increased so much as to become of importance in hunting, trapping, and export. By 1927 there were 12,000-14,000. In 1922 Sweden, almost identical in climate and flora, planted one pair of beavers on the river Bjurälven in Jämtland, in the Northwest and in 1925 in 10 more places. Though the beaver does not endure transport well, is subject to serious diseases, and is weakened by inbreeding, there were 200-300 by 1935.—*A. Norrington.*

163. FISHER, JAMES, and L. S. V. VENABLES. Gannets (*Sula bassana*) on Noss, Shetland, with an analysis of the rate of increase of this species. *Jour. Animal Ecol.* 7(2): 305-313. 1938.—An increase from 1 pair in 1914 to 1,518 breeding pairs in 1938 is noted. This rapid increase is largely due to new colonization from the outside, which lasted until, at least, 1935. A supposition is made that gannets first breed 4 years after hatching. Gannets prevent guillemots (*Uria aalge*) from nesting within "beak range" of their own nests.—*S. C. Kendeigh.*

1672. SCHAFFNER, JOHN H. The importance of phylogenetic taxonomy in systematic botany. *Ohio Jour. Sci.* 38 (6): 296-300. 1938.—The importance of the phylogenetic viewpoint both in the teaching of taxonomy and in special systematic studies is emphasized. From the broadest point of view the present kingdom of plants is represented by 7 progressive divisions or subkingdoms, each characterized by a number of fundamental potentialities or characteristics which form an accumulative series as follows: 1, Protophyta—18 accumulative fundamental potentialities; 2, Nematophyta—18+12=30; 3, Bryophyta—30+15=45; 4, Pteridophyta Homosporae—45+15=60; 5, Pteridophyta Heterosporae—60+10=70; 6, Gymnospermae—70+15=85; 7, Angiospermae—85+15=100. On this basis a correct segregative phylogenetic system can be developed which will not only give correct views of relationships but also a correct picture of the evolutionary processes and trends.—*J. H. Schaffner.*

EXPLORATIONS, EXPEDITIONS, ETC.

1673. WARD, F. K. Mr. F. Kingdon Ward's fourteenth expedition in Asia. XIII. Singapore. *Gard. Chron.* [London] 104(2702): 268-269. Illus. 1938.

CONSERVATION AND NATURE STUDY

1674. CHAPMAN, FRANK M. Life in an air castle. Nature studies in the tropics. xii+250p. Frontispiece, illus. with drawings by FRANCIS L. JQUES and from photographs by the author. D. Appleton-Century Co., Inc.: New York, 1938. Pr. \$3.—The "air castle," located on Barro Colorado, a forested island of about 4000 acres, in Gatun Lake, the Canal Zone, is a small cottage with balcony jutting practically into the forest and overlooking a small clearing made to facilitate observations and study of the teeming life of the tropics. The author has spent 12 Dry Seasons (Dec.-April) on the island, a history of the first 4

of which is contained in a previous publication, "My tropical air castle" [see B. A. 7(4): entry 7604], to which the present volume is a sequel. Accounts are given of birds, beasts, and plants as observed from the balcony as well as from other strategic points, e.g., from a blind placed in the top of a group of robust palms, from which lofty perch, activities of coatis, monkeys, and birds in a big almendro tree, and of agoutis and peccaries below this tree were noted and descr.—Data covering 3 years of the life of a remarkably intelligent coati* are recorded. In a chapter entitled "My monkey neighbors," the howler, Capuchin, squirrel, and night monkey are descr. and illustrated by some unusual photographs. Other chapters descr. experiments made to determine how carrion is located by turkey buzzards*; the courtship of Gould's manakin* (*Manacus vitellinus*); and habits of the smooth-billed ani* (*Crotophaga ani*). In an appendix a list is given of the 251 spp. of birds thus far recorded from Barro Colorado. A bibliography and an index are also given.—*M. J. Fisher.*

MUSEUMS, BOTANICAL AND ZOOLOGICAL GARDENS, AQUARIA, ETC.

1675. BISWAS, K. Court historique du Jardin botanique royal de Calcutta. *Bull. Soc. Bot. France* 85(5/6): 328-330. 1938.

TEXTS AND EDUCATION

1676. CURTISS, ANTHONY. A short zoology of Tahiti in the Society Islands. xvi+193p. Guide Printing Co., Inc.: Brooklyn, N. Y., 1938. [no pr.]—Deals with the mammals, birds, reptiles, fishes, insects and worms of Tahiti.

MISCELLANEOUS

1677. ESSEVELD, H., and A. G. van VEEN. The Medical Laboratory at Batavia re-named "Eijkman Institute" on its fiftieth birthday. *Bull. Colon. Inst. Amsterdam* 1(4): 298-306. 1938.

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 1675, 1819, 2820, 2929, 3053, 3168)

HISTORY

1678. GOVAERTS, JEAN. L'histoire de la Chirurgie. *Ann. et Bull. Soc. Roy. Sci. Méd. et Nat. Bruxelles* 1937 (9/10): 221-240. 1937 (rec'd 11-2-38).—The history of surgery from primitive times to about 1900.—*E. M. Boyd.*

BIOGRAPHY

1679. ANONYMOUS. Edward Murray East, October 4, 1879–November 9, 1938. Member of the editorial board of *Genetics*, 1916-1938. *Genetics* 24(1): Portrait. 1939.

1680. CAPPELLETTI, C. Cenzo necrologico del Prof. Achille Forti. *Ann. R. Accad. Agric. Torino* 80: 19-22. 1937(1938).

1681. FAIRCHILD, DAVID. Guy N. Collins, plant explorer and geneticist. August 9, 1872–August 14, 1938. *Jour. Heredity* 29(11): 402-408. Frontispiece, 3 fig. 1938.—A brief, informative appreciation with photographs.—*L. M. Dickerson.*

1682. GEILING, E. M. K., and E. A. EVANS, Jr. John J. Abel (1857-1938). *Arch. Internat. Pharmacodyn. et Théor.* 60(3): 241-250. 1 fig. 1938.—Obituary, with bibliography.—*G. A. E.*

1683. MERRIMAN, DANIEL. Peter Artedi [1705-1735]—systematist and ichthyologist. *Copeia* 1938(1): 33-39. 2 fig. 1938.—The author discusses his early life, his educa-

tion at the Univ. of Upsala, his friendship with Linnaeus, the events leading to his death at Leyden, and his place in history as a systematist and ichthyologist. Artedi is given credit for being the first to produce a system of classification approaching modern standards in any branch of zoology, for realizing the universal applicability of his system, and for supplying the last link in the chain of events that led to the Linnaean system of classification.—*D. Merriman.*

1684. NAVES, Y. R. Alexandre Stanislas Pfau. *Helvetica Chim. Acta* 21(6): 1562-1570. 1938.

1685. OEHSER, PAUL H. A handlist of American naturalists, based on the Dictionary of American Biography. *Amer. Nat.* 72(743): 534-546. 1938.—A résumé of the scope of the Dictionary of American Biography, followed by a tabular list of the 378 naturalists whose biographies appear in it. The following information is given with each entry: Complete name of naturalist, years of birth and death, his field of research or interest, and his biographer. The list covers the period 1622-1933.—*P. H. Oehser.*

1686. SMITH, N. R. Fred Campbell Meier. *Science* 88 (2280): 233. 1938.—Distinguished American phytopathologist; died July 28, 1938.

1687. UTTIEN, H. Boerhaave as a botanist. *Chronica Botanica* 4(4/5): 399-403. Portrait. 1938.

BIBLIOGRAPHY

MRS. EILEEN R. CUNNINGHAM, *Editor*

(See also B. A. 13(1): Entry 1200)

1687A. ISTITUTO DI SANITÀ PUBBLICA [ROME], RENDICONTI. Vol. 1, no. 1, 1938. 350p. Editorial Board, ROMANO MAGGIORA-VERANGO, MASANIELLO CINGOLANI, DOMENICO MAROTTA, GIULIO CESARE

TRABACCHI, GREGORIO BIRELLI, ALBERTO MISSIROLI, GIUSEPPE DRUETTI, MASSIMO PANTALEONI. Publ. by Istituto di Sanità Pubblica, Rome.—The first issue contains the following articles: D. MAROTTA, G. LAZZA-

RINI e A. CALÒ, I medicinali e il metodo Rinaldi per la cura della artriti [The remedies and the Rinaldi method for the treatment of the arthritides]; F. Di STEFANO e G. ROSANOVA, Ricerca di coloranti sintetici nelle paste alimentari [The recognition of synthetic dyes in food confectios]; R. INTONTI, Utilizzazione dei fondi di caffè [Utilization of coffee grounds (dregs)]; A. CALÒ e F. MUNTONI, La ricerca degli ossidanti nelle farine [The recognition of oxidizing substances in flour]; G. LA PAROLA, La ricerca della formaldeide in alcuni prodotti alimentari conservati [The detection of formaldehyde in various canned food products]; G. PENSO, Sui fenomeni dissociativi e le varianti cromogene di uno stafilococco non patogeno [The dissociative phenomena and the chromogenic variants of a non-pathogenic staphylococcus]; G. PENSO e B. ROSA, Sull'esistenza di una particolare affezione morbosa dei suini da virus della malattia dei porcai.—Ricerche sperimentali su detto virus [The existence of a peculiar disease of swine caused by the virus of the disease of swine herders.—Experimental research upon this virus]; B. BABUDIERI, I corpi di Foà-Kurloff [The Foà-Kurloff bodies]; G. DRUETTI, Il ciclo evolutivo dell'abitazione umana [The evolutive cycle of human habitations]; B. ROSA e V. MAZZARACCHIO, La differenziazione sierologica delle varie specie di carni negli insaccati [The serological differentiation of the various kinds of meats put up in casings (sausages, etc.)]; V. MAZZARACCHIO, La trasmissione sperimentale dell'fta epizootica alla cavia [The exptl. transmission of foot and mouth disease to the guinea pig]; G. C. TRABACCHI, Stabilizzazione della tensione della corrente alternata destinata alla alimentazione degli apparecchi per Raggi X [Stabilization of the voltage of the alternating current supplying X-ray machines]; G. C. TRABACCHI e E. AMALDI, Metodo fotografico per il rilievo della fluttuazione dei Raggi X emessi da una ampolla [Photographic method for recording (observing) the fluctuations of the X-rays coming from a bulb]; R. MAGGIORA-VERGANO, L'infezione tubercolare negli animali domestici [Tuberculous infection in the domestic animals]; R. MAGGIORA-VERGANO e L. VIVALDI, La cellula fotoelettrica e sue applicazioni nel dosaggio dei vaccini batterici [The photo-electric cell and

its applications in the standardization of bacterial vaccines]; B. BABUDIERI, Nuovo metodo di diagnosi biologica della gravidanza. [A new biological method for the diagnosis of pregnancy].

1688. JOURNAL OF THE SOUTH AFRICAN FORESTRY ASSOCIATION. Vol. 1, no. 1. October, 1938. Edited by J. M. TURNBULL, with assistance of an Editorial Committee. 66p. Illus. Publ. in April and October. P. O. Box 727, Pretoria, Union of South Africa. Price 6 s. (net) per copy.—This Journal is intended to be a vehicle for the publication of general articles and research papers on forestry and allied subjects. The first issue contains the following papers: N. L. KING, Historical sketch of the development of forestry in South Africa; F. S. LAUGHTON, The raising of transplants of indigenous tree species for open-rooted planting; S. P. SHERRY, The rate of growth and health of the southern pines in the Midland Conservancy; M. H. SCOTT, South African grown furniture woods; J. H. VAN WYK and LEN VERWOERD, The toxicity of South African creosote; J. D. KEET, The place of wattle bark in the tanning industry; J. M. TURNBULL, The influence of age on summerwood ratio in pine timber; S. St. C. BALLENDEN, Um'Doni or Waterwood (*Syzygium cordata*).—W. N. Sparhawk.

1689. SMITH, ROGER C. Some phases of entomological writing from the viewpoint of the reader. *Jour. Econ. Ent.* 31(5): 563-565. 1938.—The importance of providing a background for readers to understand the value of new contributions and to correlate new facts with previously known information is stressed. Abstracts or summaries of longer papers help readers materially. Extended summaries of the literature of major pests are needed to reduce the amount of literature review necessary in future writing and reading. The several methods of writing and printing bibliographies and referring to bibliographic entries in papers are given.—R. C. Smith.

1691. ANONYMOUS. Inostrannafâ botanicheskafâ literatura po sistematike i geografii tsvetkovykh rastenii za 1933-1935 gg. [The literature of 1933-1935 on the taxonomy and phytogeography of the phanerogams.] *Sovetskâia Botanika* [*Soviet Botany*] [*Leningrad*] 1937(6): 168-232. 1938.

EVOLUTION

(See also in this issue Entries 1736, 1737, 1775, 1824, 2905, 3347, 3358)

1692. BRADLEY, JOHN HODGDON. Patterns of survival. An anatomy of life. 223p. Macmillan Co.: New York, 1938. Pr. \$2.25.—This is a contribution to the theory of emergent evolution which the author finds a bond between the search for objective fact by the scientist and for the meaning of life by the philosopher. As a paleontologist, he views the conditions under which life is assumed to have originated on the Earth, its first tangible expression, after a billion years of unrecorded evolution, in the Pre-Cambrian and early Cambrian fossils, and its gradually increasing diversity and complexity accompanied by the rise, dominance, decline and extinction of type after type. Throughout time the changing environment has been effective in guiding organic evolution, but there have been produced successively more efficient integrations possessing new attributes not predictable from the properties of the elements composing them. Contrary to the modern genetic dictum that adaptation is haphazard, the author argues that "fitness is the most striking aspect of vital phenomena," that basic patterns of successful living may be recognized, and that convergent and parallel adaptations to similar physical conditions have been conspicuous and recurrent throughout geological time. The value of competition and struggle with enemies and a rigorous environment are emphasized as well as the benefits of cooperation. In the later chapters these principles are applied to man with the conclusion that his ability both to modify his environment and to adjust himself to it by inventing protective devices have led to the improving effects of natural selection and have led to environmental maladjustments which are the cause of many of our modern social woes. The ease with which we can overcome our natural enemies and our practise of conserving our weaklings on the one

hand and the destruction of our physically most fit through intra-specific warfare on the other, has led to specific deterioration. Man is the only species that regularly wars against itself and destroys his natural resources. Man possesses the power to direct his own evolution, but he "typically seeks such good as is local, immediate, and obvious, and disdains or opposes all other kinds of good." If efforts for advancement can be coordinated and aimed to benefit the species as a whole rather than individuals or segregated groups, "who can say what dreams might not possibly come true." The author personifies Nature as a directing force and makes large use of figures of speech, a style which makes the book pleasantly readable but best adapted to the mode of thought of the non-scientist rather than the scientist.—J. P. Moore.

1693. HUXLEY, JULIAN S. Darwin's theory of sexual selection and the data subsumed by it, in the light of recent research. *Amer. Nat.* 72(742): 416-433. 1938.—Darwin's theory of sexual selection must be considerably modified in the light of recent work. A great many characters supposed by him to subserve display in reality subserve threat to rivals. Mutual display, rejected by Darwin, turns out to be widespread in birds. Recent work has shown that display may have biological value in synchronizing mating rhythms, and that both display and threat have a direct psycho-physiological effect both on maturation of gonads and on effective reproductive behavior. Characters subserving them accordingly will have selective value, although not sexual selection but natural selection will be operative (except where polygamy or promiscuity prevails, when true sexual (inter-male) selection will also operate). The psychophysiological effect of display and threat may extend to other members of the species

which witness it. This appears to be the explanation of the frequent cases of social display and special mating grounds. A subsidiary function of mutual display appears to be to act as a bond holding members of a pair together during the breeding season. Polygamy appears to have evolved in 3 distinct ways in birds, leading to territorial, family, and mating polygamy respectively. The selective value of display and threat will vary quantitatively. It may be fractional (incomplete reproductive capacity of one mate); unitary (securing or not securing a mate); or multiple (securing many mates as against none). Darwin's term sexual selection can be replaced by 2 terms: epigamic selection and intra-sexual selection. In the latter, we must distinguish between the component of general advantage to the species and that of purely interindividual advantage: the ratio of these may vary widely. Most characters involved in display and threat exert their effects via the distance receptors and nervous system of other individuals, and may thus be called allaesthetic.—*J. S. Huxley.*

1694. ROONWAL, MITHAN LAL. On a new law of the bi-triangular medial concentration of the cephalic appendages in the Chilopoda and the Insecta. *Jour. Morph.* 64(1): 1-8. 3 fig. 1939.—A law of the "bi-triangular medial concentration of the cephalic appendages" in the Chilopoda and the Insecta is propounded. According to it, the cephalic appendages lying in front of and behind the intercalary pair of appendages undergo a concentration, both in phylogeny and in ontogeny, toward the median line. In this way, 2 hypothetical triangles, termed the "anterior or procephalic triangle" and the "posterior or gnathocephalic triangle" are formed, having a common base in the level of the intercalary appendages. The cephalic appendages occupy roughly either the sides or the apices of the triangles and the degree of their final medial concentration is in direct proportion to their distance from the triangular base. Before the final bi-triangular condition is achieved by the appendages, varying types of transitory shiftings are passed through.—*Auth. (courtesy Wistar Bibl. Serv.).*

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. McCLUNG, *Animal*

(See also in this issue Entries 1663, 1742, 1745, 1747, 1749, 1751, 1756, 2621, 2817, 2997, 3261, 3398)

GENERAL

1695. BARIGOZZI, CL. La signification du spodogramme pour l'étude de la structure des chromosomes. *Bull. Histol. Appl. Physiol. et Path.* 15(8): 213-219. 1 fig. 1938.—The spodogram, or ash pattern, of microincinerated giant nuclei from the salivary glands of *Drosophila* repeats in detail the pattern of the stained chromosomes. The dark bands contain the bulk of the ash. This ash is phosphate, originally part of the thymonucleic acid of the chromosome.—*J. G. Sinclair.*

1696. SCHULMAN, CYRIL A. Recent advances in the chemistry of chromosomes. *Jour. Heredity* 29(11): 414-416. 1938.—A brief review is given of published material to date concerning the macro- and microchemical investigations on chromosomes, with particular reference to salivary chromosomes. This includes a short explanation, with diagrams of nucleic acid as analyzed macrochemically and tests for the detection of minute amounts of this acid microchemically with its variation in respect to cell function. The application of these tests to the giant salivary chromosomes is given together with a brief outline of the theory of the chemical construction of chromosomes as postulated by Miss D. M. Wrinch.—*C. A. Schulman.*

PLANT

1697. BENOIST, E. Recherches caryologiques sur quelques espèces du genre *Salvia*. *Rev. Cytol. et Cytophytol. Vég.* 2(4): 415-439. 2 pl. 1937(1938).—The number of spp. studied was not sufficient to establish a basic figure for the series. A table is given of chrom. numbers of different spp. of *Salvia* as found by other investigators. The author suggests a polyploid series with the following haploid numbers: 6-7-8-9-10-11-17-19. He found 2 types of resting nucleus and somatic mitosis. In the 1st type the resting nucleus has a large, single and central nucleolus, chromatic granulations scattered in the nucleus, inserted in a fine granule, and slightly chromatic network. A study of prophase figures showed that the granulations were chromocenters. The 2d type of resting nucleus was found only in *S. valentina*. In this type the network was strongly chromatic. The chromocenters were more or less elongated and were scattered through the nucleus. Mitosis in the 2 types is discussed in some detail. The formation of the chromosomes during the prophase could be more readily determined in the 1st type. The metaphase stage was similar in both types. In the 1st type "dechromatinisation" begins at the end of anaphase and the chromosomes had lost their characteristic shape at the beginning of telophase. In the 2d type the chromosomes remain intact until the beginning of telophase.—*W. S. Malloch.*

1698. EIGSTI, O. J. A cytological study of colchicine effects in the induction of polyploidy in plants. *Proc. Nation. Acad. Sci. U. S. A.* 24(2): 56-63. 1 pl. 1938.—Stem

and root meristems were used to study the effect of colchicine upon individual cells of these tissues. Cytogenetic changes were produced when meristematic tissues were bathed in solns. of colchicine which varied in conc. from 1% to .01%. *Allium*, *Zea*, *Triticum*, and *Raphanus* were used in this study. Polyploid cells, multinucleate cells, chromosomal abnormalities and nuclear abnormalities were produced. Use of colchicine was suggested as a possible method to induce polyploidy which was verified in a number of cytogenetic studies. The cytological changes were produced by the inhibition of the spindle fiber mechanism. The chromosomes divided but the separation of daughter chromosomes into daughter nuclei to form daughter cells was inhibited. The restitution nucleus was a polyploid nucleus. The obvious morphological change was a marked thickening of root and stem in the meristematic region.—*O. J. Eigsti.*

1699. EMSWELLER, S. L., and PHILIP BRIERLEY. Effect of high temperature on metaphase pairing of *Lilium longiflorum* "Giganteum" and the "Creole" lily. *Proc. Amer. Soc. Hort. Sci.* 35: 104. 1937(1938).—Four plants of *Giganteum* and 6 of *Creole*, with buds in which meiosis was about to be initiated, were placed in a chamber in which the temp. could be raised in a few min. to 50° C. or higher. A thermo-couple was placed inside one of the buds, and the temp. raised quickly to 45-46° C. and held within this range for 30 min. The plants were then returned to the greenhouse. In 3 of the 4 *Giganteum* plants treated, many irregularities of pairing were found in pollen mother cell smears, ranging from complete failure to form pairs to an unusual condition found in 2 plants, in which enucleate pollen mother cells occurred in the same anther with others containing 1 bivalent, 2 bivalents, and up to 15 bivalents. Fragments and unpaired chromosomes were also found in these 2 plants. In the control and in one of the heat treated plants, irregularities were not found. The heat-treated "Creole" plants also exhibited a high frequency of irregularities, ranging from complete failure to pair to the normal formation of 12 bivalents. Many cells also exhibited the unusual condition of a completely disorganized and fragmented mass of chromosomes, which was also found in the untreated plants and which has been called "blown-up." The frequency of "blown-up" cells was higher in treated than in untreated "Creoles." There was also a high frequency of tetraploid pollen mother cells, and in all those in which chromosome associations could be detd. with certainty there were 24 bivalents. This is additional cytological evidence that the *Creole* lily is probably a hybrid.—*C. H. Connors.*

1700. FORD, C. E. A contribution to a cytogenetical survey of the Malvaceae. *Genetica* 20: 431-452. 1938.—Chromosome numbers of 32 spp. from 13 genera representing 3 of the 4 tribes of the Malvaceae are reported. Some

of the chromosomes of the diploid spp. of *Abutilon* can be identified.* Attachment of chromosomes to the nucleolus in the prophase of mitosis or meiosis has been observed in several genera, especially *Abutilon* and *Sidalcea*. Tetraploid strains occur in several *Hibiscus* species. 7 is the basic number in the Malveae and Ureneae, and probably also in the Malopeae. The basic number in the Hibisceae is uncertain, though the evidence is not incompatible with $b=7$.—*E. W. Lindstrom*.

1701. HEIMANS, J. Chromosomes in the genus *Mentha*. *Chronica Botanica* 4(4/5): 389-390. 1938.—In *M. longifolia*, $n=9$; in *M. rotundifolia*, $2n=18$ (contrary to Schürhoff). *M. nemorosa* has $2n=36$ and is probably a reduplicated hybrid between the first two. *M. velutina* also has $2n=36$, and it is not therefore a back-cross of *nemorosa* to *rotundifolia*, as usually assumed.—*R. E. Cleland*.

1702. HUSTED, LADLEY. Relational coiling in *Tradescantia*, *Allium* and *Vicia Faba*. *Cytologia* 8(3/4): 368-376. 9 fig. 1938.—An analysis of the direction of relational coiling, and the amount of coiling in the chromosomes of the prophase and metaphase of the microspore mitosis in the named plants is given. The correlation is not sharp between length of chromosome and number of chiasmata.—*H. Hibbard*.

1703. KISHIMOTO, ENKO. Chromosomenzahlen in den Gattungen *Panicum* und *Setaria*. 1. Chromosomenzahlen einiger *Setaria*-Arten. *Cytologia* 9(1): 23-27. 3 fig. 1938.—Five spp. studied show diploid numbers of 18, 36, or 72; the largest pollen grains have the most chromosomes.—*H. Hibbard*.

1704. KOLLER, P. C. Asynapsis in *Pisum sativum*. *Jour. Genetics* 36(2): 275-306. 1 pl. 1938.—In an asynaptic line due to one recessive gene, sister plants show different degrees of contraction and interchromatid coiling at mitotic metaphase, and chromosome doubling frequently occurs owing to the arrest of anaphase or to fusion of sister nuclei following a failure of cytokinesis. At meiotic metaphase the number of bivalents per cell, the mean number of chiasmata per actual bivalent and the degree of contraction are positively correlated and are all reduced. Nearly half the chromosomes, especially the longest, are unpaired at 1M, probably owing to failure of chiasma formation rather than failure of prophase pairing. This leads to irregular segregation and formation of microspores with abnormal chromosome numbers. The pollen is about 90% abortive. The asynaptic plant was trisome, another was a structural hybrid and also showed anomalous (transverse) centromere division.—*E. Sutton*.

1705. KOSTOFF, DONTCHO. The effect of centrifuging upon the germinated seeds from various plants. *Cytologia* 8(3/4): 420-442. 21 fig. 1938.—Germinated seeds of several spp. were centrifuged for short periods repeatedly. Dividing cells suffered abnormal shift of chromosomes to one pole or the other, or dislocation of segments of chromosomes occurred. Some morphological abnormalities were produced, such as variation in leaf shape, semi-sterility, variegated leaves with chlorophyll deficiency.—*H. Hibbard*.

1706. KUWADA, YOSHINARI. Behavior of chromonemata in mitosis. VIII. A chromosome study by the artificial uncoiling method of the chromonema spirals. *Cytologia* 9(1): 17-22. 1 pl. 1938.—In pollen mother cells of *Tradescantia*, chromosomes are uncoiled by NH_4OH and stained in acetocarmine. This demonstrates a minor coiling formed in later prophase and a major twisting formed in early prophase.—*H. Hibbard*.

1707. MATSUURA, HAJIME. Chromosome studies on *Trillium kamtschaticum* Pall. VI. On the nucleolus-chromosome relationship. *Cytologia* 9(1): 55-77. 1938.—In *T. kamtschaticum*, with no satellited chromosomes, development of nucleoli (negative to Feulgen reaction) is related to particular ends of particular chromosomes. In *Paris hexaphylla* the nucleolus develops on the satellite of one chromosome. In abnormal divisions where a single chromosome may form a micronucleus, any chromosome is capable of nucleolus formation. A theory is presented of the origin of satellite chromosomes.—*H. Hibbard*.

1708. MATSUURA, HAJIME. Chromosome studies on *Trillium kamtschaticum* Pall. VII. Additional evidence for the Neo-two-plane theory of bivalent constitution. *Cytologia* 9(1): 78-87. 8 fig. 1938.—Further evidence is

presented to support the writer's theory of bivalent constitution, which is built upon the following 3 principles: (1) random two-by-two opening of the 4 daughter chromatids (excluding their kinetochores) at diplotene; (2) random two-by-two assortment of the 4 daughter kinetochores at 1st metaphase; (3) independent occurrence of (1) and (2). An important consequence of this theory is that the 1st meiotic division is equational twice as often as it is reductional. Additional evidence supports the writer's previous observation that the proportion of cross to parallel configurations for each bivalent of the complement is 2:1, there being no correlation between the modes of chromatid opening of any 2 different members of a complement, nor between the mode of opening and the position of the kinetochore. Parallel association of the members of a bivalent has been found to result in a 2:1 ratio of equational to reductional separations; in cross association two instances in which one arm separates equationally and the other arm reductionally occur to one in which both arms separate equationally. The previously mentioned 2:1 ratio for equational to reductional separation at the 1st meiotic division results by combining the consequences of these 2 types of association with their relative frequencies of occurrence. The closed arm configuration of *Paris hexaphylla* is shown to be similar to cross association of *Trillium*, and the open arm configuration of the former to parallel association of the latter. A 2:1 ratio, respectively, of closed- and open-arm configurations in *Paris* has been recorded for the 1st meiotic division.—*A. Hecht*.

1709. UPCOTT, MARGARET. The internal mechanics of the chromosomes. VI. Relic and relational coiling in pollen-grains. *Cytologia* 8(3/4): 398-407. 16 fig. 1938.—Prophase chromosomes in pollen grains of the hyacinth show both types of coiling, the directions of which may be the same or opposite in the 2 arms of a given chromosome. The 2 arms of the nucleolar chromosome tend to show relic coiling about twice as often in the same as in opposite directions, but they show no correlation in relational coiling. If relic coiling is detd. by the previous mitosis, and relational coiling by the present mitosis, there seems to be no determining relation between the 2; variations are due to individuality of the chromosomes.—*H. Hibbard*.

1710. WADA, BUNGO. Experimentelle Untersuchungen lebender Zellen in der Teilung. I. Die Einwirkung des Chloroform- und Ätherdampfes auf die Mitose bei den *Tradescantia*-Haarzellen. *Cytologia* 9(1): 97-109. 2 pl., 1 fig. 1938.—Weak chloroform vapor causes a reversible cytoplasmic disintegration and swelling of chromosomes. Stronger vapor causes irreversible changes, with occasional division anomalies leading to death. Ether acts similarly, though it is less toxic.—*H. Hibbard*.

1711. WADA, BUNGO. Experimentelle Untersuchungen lebender Zellen in der Teilung. II. Die Einwirkung des Normalbutylalkoholdampfes auf die Mitose bei den *Tradescantia*-Haarzellen. *Cytologia* 9(1): 110-119. 4 fig. 1938.—A small amount of vapor calls forth a liquefaction and subsequent disintegration of the cytoplasm. The spindle and chromosomes are least affected. These changes are reversible but with stronger dosage they become irreversible and the spindle breaks down.—*H. Hibbard*.

1712. WALKER, RUTH I. The effect of colchicine on embryo sac development in *Tradescantia*. *Jour. Arnold Arboretum* 19(4): 442-445. 2 pl. 1938.—Colchicine prevents normal differentiation of embryo sac development by disturbing nuclear division and by inhibiting normal polarity in nuclear organization.

1713. YASUI, K. Myelin forms in acetocarmine smear preparation. Lecithin as a nuclear constituent. *Cytologia* 9(1): 120-131. 15 fig. 1938.—Smear preparations of PMC and tapetal cells of several plant spp. showed drops oozing from chromosomes and from nucleoli which took on various myelin forms. These were identified as lecithin.—*H. Hibbard*.

1714. YOSHINARI, KUWADA, and TAKESHI NAKAMURA. Behavior of chromonemata in mitosis. VIII. The major spirals in diakinesis. *Cytologia* 9(1): 28-34. 5 fig. 1938.—The double coiled structure of meiotic chromosomes in the pollen mother cells of *Trillium* continues in the diakinesis, the reticular structure of the chromosomes at this stage being only apparent.—*H. Hibbard*.

ANIMAL

1715. ANDRES, A. H. On the chromosome complex in several Canidae. *Cytologia* 9(1): 35-37. 5 fig. 1938.—In *Vulpes lagopus* the diploid number is 52; in *V. vulpes*, 34 with the ♂ heterogametic because of an X and a Y. There is a suggestion of racial differences: 42 diploid chromosomes have been reported for the latter species, and varying counts have been reported for *Canis familiaris*.—H. Hibbard.

1716. BEAMS, H. W., and R. L. KING. A study of the cytoplasmic components and inclusions of the developing guinea pig egg. *Cytologia* 8(3/4): 353-367. 21 fig. 1938.—In the young ovum the yolk nucleus is composed of a diplo-some imbedded in an osmiophilic idiosome which is surrounded by Golgi material. As the egg matures these elements become dispersed. Chondriosomes are evenly scattered at all times. The cytoplasmic constituents could not be stratified by centrifuging. Additional observations on atypical ova, follicle cells, and corpus luteum cells are included.—H. Hibbard.

1717. CROSS, J. C. Chromosomes of the genus *Peromyscus* (deer mouse). *Cytologia* 8(3/4): 408-419. 29 fig. 1938.—Eight spp. and 17 subsp. were studied. In most cases 48 chromosomes were found, apparently the base number. *P. maniculatus hollestieri* shows 52, which is probably exceptional, and might be accounted for by fragmentation. *P. eremicus* has 58 or more chromosomes. No attempt is made to account for the variation. These results coincide very definitely with results of the hybridization tests made by Dice.—Auth. abst.

1718. DREYFUS, ANDRÉ. Contribuição para o estudo do ciclo cromossômico e da determinação do sexo de *Rhabdias fülleborni* trav. 1926. [The chromosome cycle and sex determination in *R. fülleborni*.] *Universidade de São Paulo. Boletins da Faculdade de Filosofia, Ciências e Letras. III. Biologia Geral N.º 1* 1-144. 20 pl. 1937 (rec'd 7-15-38).—This species is closely related to *R. bufonis*. The animals of the hermaphrodite (parasitic) generation live in the lungs of *Bufo marinus* and *Leptodactylus ocellatus*. The ova are self-fertilized internally and give rise to both ♂♂ and ♀♀ (free-living generation) which in turn produce the parasitic form. Oögonia have 12 dyad chromosomes. The 1st oöcyte has 6 tetrads, the 3d oöcyte 6 dyads. The testicular region, in the same gonad, produces ova under the zone of synapsis. The 1st spermatocytes are derived from oögonia which grow less during the growth period than those which form oöcytes; they contain 7 chromosomes—5 tetrads and 2 dyads (x-chromosomes) which do not synapse. All divide giving 2d spermatocytes with 5 dyads and 2 monads. At the 2d maturation division each of the 5 dyads divides but the 2 monads behave in any of 3 ways:—(a) 1 goes to each daughter cell giving spermatids with 6 chromosomes; (b) both are retarded but 1 reaches one of the anaphase groups, the other is eliminated during spermiogenesis resulting in spermatozoa with either 5 or 6 chromosomes—the most frequent behavior; (c) both monads lag and are eliminated giving spermatozoa with 5 chromosomes. The fertilized egg shows either 11 or 12 chromosomes. The chromosomes remain entire in the blastomeres which give rise to the germ cells. In the other blastomeres each chromosome fragments into 2 parts; the ♂♂, therefore, have 11 chromosomes in the germ line and 22 in the soma; the ♀♀, 12 and 24, respectively. When parasitic forms are kept in physiol. saline, free-living sexual forms appear from the 2d to the 6th days, infesting larvae about the 8th day. The youngest stages found were spermatocytes. The 1st maturation division shows 5 tetrads and 1 dyad, the x-chromosome, which passes to one pole without division. The 2d spermatocytes are accordingly of 2 types; those with 5 dyads and those with 6. These divide in the usual manner to give 2 classes of spermatozoa. Somatic nuclei have 22 chromosomes. Oögenesis has not been studied adequately. Oögonia have 12 chromosomes. Larvae leave the eggs inside the mother and feed on her body and the remaining eggs. Usually only 2 larvae are produced.—*Rhabdias* is a proterogynic hermaphrodite, since it possesses a ♀ soma and gonads in which the first differentiating cells are oögonia; and, since ova and sperm form successively several times, it is an alternant hermaphrodite. The non-existence of ♂♂ in the parasitic generation, and the chromo-

somal cycle in relation to sex in the *Rhabdiasidae*, are discussed.—E. E. Carothers.

1719. DRUMMOND, F. H. Meiosis in *Dasyurus viverrinus*. *Cytologia* 8(3/4): 343-352. 6 fig. 1938.—The diploid number of chromosomes is 14, with the ♂ heterogametic. The sex chromosomes form karyosomes at the 1st division, associate themselves terminally without chiasmata. The autosomes form chiasmata at random with a frequency proportional to their length.—H. Hibbard.

1720. GALGANO, MARIO. La formula cromosomiale e il problema del cromosoma del sesso in *Amblystoma tigrinum*. [The chromosomal pattern and the sex chromosomes in *A. tigrinum*.] *Monitore Zool. Italiano Suppl.* 48: 84-86. 1938.—The chromosomal formula is $2n=28$, $n=14$. There is no morphological evidence of a sex chromosome.—E. Cutuly.

1721. GATENBY, J. BRONTË, and B. N. SINGH. The Golgi apparatus of *Copromonas subtilis*, and *Euglena* sp. *Quart. Jour. Microsc. Sci.* 80(4): 567-592. 3 pl., 9 fig. 1938.—In *C. subtilis* and *Euglena* sp. there is a Golgi apparatus consisting of osmiophil material in the form of granules. Water collects inside the granules, so that they become spherical vacuoles, identical with so-called contractile vacuoles (*Copromonas*) or accessory contractile vacuoles (*Euglena*). In *Euglena*, the Golgi apparatus is closely applied to the so-called contractile vacuole, and consists of numerous loaf-shaped osmiophil bodies which undergo a regular series of changes from systole to diastole, and vice versa. In *Copromonas*, the osmiophil material may either form a thick cortex surrounding the reservoir, it may be attached to the reservoir in fairly regular loaf-shaped bodies as in *Euglena*, or may be completely detached from it. The so-called contractile vacuoles of *Copromonas* are vesicles containing water, which are formed on the site of the osmiophil granules. The reservoir of *Copromonas* is indistinguishable from an enlarged contractile vacuole. During division of *Copromonas*, 2 reservoirs are found in the early stages before the nucleus becomes dumb-bell shaped. These seem to have originated from the osmiophil vacuoles. The remaining osmiophil material, when present, moves to the mid-line. When the new cell-wall between the 2 organisms has passed down, about $\frac{1}{2}$ the length of the dividing monad, the osmiophil material splits into 2 sub-equal groups and is so divided between the 2 organisms. There is therefore a definite dictyokinesis in *Copromonas*. Near this period, the osmiophil material may become scattered about the upper middle and upper region of the dividing monads, but finally becomes situated in the region of the reservoir. The osmiophil material (Golgi apparatus) persists throughout conjugation and encystment, even when a reservoir cannot be found.—From auth. summ.

1722. IVANIĆ, MOMČILO. Über die mit der Chromosomenbildung verbundene promitotische Grosskernteilung bei den Vermehrungsstadien von *Chilodon uncinatus* Ehrbg. *Arch. Protistenk.* 91(1): 61-68. 4 fig. 1938.—Evidence, strengthened by 4 figures showing chromosomes on spindles and poles of plastin, is offered to show that division in the macronucleus of *C. u.* is promitotic and not amitotic. $2n=4$.—M. Gojdics.

1723. KAWAGUCHI, EISAKU. Der Einfluss der Eierbehandlung mit Zentrifugierung auf die Vererbung bei dem Seidenspinner. II. Zytologische Untersuchung bei den polyploiden Seidenspinners. *Cytologia* 9(1): 38-54. 29 fig. 1938.—The diploid count for spermatogonia and oögonia is 56; the triploid is 84. First and 2d maturation divisions show irregularity with averages of 38 and 43.3. Sterility is associated with deviation from regular number of chromosomes.—H. Hibbard.

1724. KAWAGUCHI, EISAKU. Der Einfluss der Eierbehandlung mit Zentrifugierung auf die Vererbung bei dem Seidenspinner. III. Beweise für die Beziehung der Geschlechtschromosomen zu den Nukleolen. *Cytologia* 9(1): 88-96. 13 fig. 1938.—In diploid spermatogonia there are 2 nucleoli; in triploid, 3; in tetraploid, 4. In polyploid oögonia the parallel is not the same. The number of nucleoli is directly proportional, however, to the Z-chromosomes, which are in all probability Sat-chromosomes.—H. Hibbard.

1725. KIKKAWA, H. Studies on the genetics and

cytology of *Drosophila ananassae*. *Genetica* 20: 458-516. 1938.—A full discussion of the genetics and cytology of *D. ananassae*, including taxonomic description, chromosome structure, mutants and linkage maps of 71 genes, racial inversions and evolutionary observations. This species has 4 pairs of V-shaped chromosomes in the ♀; and one of these is replaced by a small J-shaped chromosome in the ♂. The form of this Y-chromosome differs according to the strain. Salivary gland chromosome studies are included. Mutation frequencies are compared with those in other *Drosophila* spp. The discovery is reported of the fact that certain regions of the autosomes are homologous with sex-chromosome regions. A list of all mutations for this species appears in the appendix, together with a summary of linkage data and a brief note on the sump method of examining the surface of an opaque body.—*E. W. Lindstrom*.

1726. MORGAN, L. V. Origin of attached-X chromosomes in *Drosophila melanogaster* and the occurrence of non-disjunction of X's in the male. *Amer. Nat.* 72(742): 434-446. 1938.—There are records, by various observers, of 30 ♀♀ that had received 2 X-chromosomes from the ♂ parent. They were recovered mostly from Y-eggs of attached-X ♀♀ (XXY). 18 of the patrilinuous ♀♀ were tested. 2 of them gave high non-disjunction of X's for 2 generations and can be explained if an X was involved in a translocation. Another 12 were found to have received 2 separate X's from their fathers, showing equational non-disjunction in the ♂♂. The remaining 4 carried 2 X's attached to each other. On one hypothesis the X's may have become attached through incomplete separation of chromatids at meiosis in the ♂. It is here suggested that probably a more frequent explanation is found in crossing-over between an arm of a Y-chromosome and an X, in a ♂ or in a ♀ carrying a Y (the XY^s or Y^s-chromosome being transmitted to offspring), and subsequently crossing-over in a ♂ at the 4-(partially 6-) strand stage of meiosis between the remaining arm of Y and the chromatid to which it is not attached. The kinds of exchange that would be involved have been demonstrated by Stern, Kaufmann, Philip and Neuhaus. 2 of the 4 attached-X ♀♀ received their attached-X's from a father and son, which is evidence for the 2d hypothesis. There is evidence that 2 similar exchanges, in fact, occurred in the history of another attached-X ♀. She received 2 different X's attached to each other from her mother. Crossing-over took place first in an attached-X ♀ (XXY) between an X and an arm of Y; and in a much later generation crossing-over took place in a ♀, that had received the compounds XY^s or Y^s-chromosome, between the remaining arm of Y and her other X-chromosome. The attached-X's consisted of the maternal X (that had carried an arm of Y) and the paternal X. The frequency with which 2-X sperm occurs is indicated in 2 sets of observations. In 1 exp. the ♀ parents were attached-X ♀♀ (XXY) and in the other the ♀ parents carried a duplication for X, attached to one of the X's, and a Y-chromosome (XXX^{py}Y). In both exps. 0.2% of the sperm that fertilized Y-eggs carried 2 X's. The XX-sperm was recovered in 11 ♀♀, of which 2 that were tested carried separate X's.—*L. V. Morgan*.

1727. NAGAIRO, K. Zytologische Untersuchungen über die Epithelzellen der Gallenblase des Menschen. *Cytologia* 9(1): 132-163. 22 fig. 1938.—In many respects the cells are similar to those of the gut epithelium,—oval nuclei, brush border, cement bars joining distal ends of cells, apical Golgi net, chondriosomes in numerous threads and granules parallel with long axis of cell and forming thick mass just below cuticle. Fat droplets are found among the chondriosomes without relation to the Golgi apparatus, and small mucus droplets arise in the Golgi zone and move to free border.—*H. Hubbard*.

1728. PFEIFFER, H. H. Double refraction measurements and structural changes in mitotic spindles disturbed by centrifugal force. *Biodynamica* 35. 1-8. 1938.—Dividing eggs cells of the oligochaete *Rhynchelmis limosella* were centrifuged at forces from 500 to 122 g. in a polarizing centrifuge-microscope and the intensity of the double refraction of the mitotic spindles measured. The spindles, which are positively birefringent with respect to their long axis, showed a double refraction which increased with the

centrifugal rate (a few values are given). There is some expl. evidence that the mechanical properties of the spindles are anisotropically distributed.—*B. Luyet*.

1729. ROJAS, P., y L. S. RESTA. Aparato de Golgi y vacuoma de la fibra muscular estriada. (Estudio histofisiológico.) [Golgi apparatus and vacuoma in striped muscle fibres.] *Rev. Soc. Argentina Biol.* 14(6): 353-356. 2 pl. 1938.—The Golgi apparatus, as visualized by the Kolatschew-Nassonow technique, consisted of 2 small bodies impregnated by the osmic acid and situated near the poles of the nucleus. Faradic stimulation of the muscle for 30 to 60 sec. split these bodies into fragments; stimulation for 3-5 mm. caused the osmophile substance to diminish and sometimes to disappear almost completely. When stimulation was continued for 10 min. the Golgi apparatus regained its original aspect; recovery was also observed after 1-2 mm. rest. The vacuome (Chlopin's Krinoma) could be differentiated from the Golgi apparatus; it appeared on intravital staining with neutral red as granules placed within and without the fibrils; faradic stimulation caused its disappearance and no recovery was observed on prolonging stimulation for 10 min.—*J. T. Lewis*.

1730. SINGH, B. N. The cytology of *Amoeba proteus* "Y" and the effects of large and small centrifugal forces. *Quart. Jour. Microsc. Sci.* 80(4): 601-636. 2 pl., 2 fig. 1938.—Both the electrical centrifuge and the ultra-centrifuge were used in this investigation. The cytoplasmic bodies, which are stratified in the following order from the centripetal to the centrifugal pole, are: sudanophil fat and contractile vacuole, mitochondria, pre-existing neutral red bodies, bi-pyramidal crystals and the nutritive spheres containing glycogen as reserve food material. The sudanophil fat is lighter and the mitochondria heavier than the ground cytoplasm. The neutral red bodies are probably enzymic in nature. No homologue of the Golgi apparatus could be seen. Organisms, from which most of the heavier cytoplasmic bodies (crystals and nutritive spheres) had been removed by ultra-centrifuging, remained rounded for several days until these bodies had been reformed, when the organisms reverted to their normal condition.—*B. N. Singh*.

1731. SLACK, H. D. The association of non-homologous chromosomes in Corixidae (Hemiptera-Heteroptera). *Proc. Roy. Soc. Edinburgh* 58(2): 192-212. 1938.—*Corixa punctata*, *Sigara carinata*, and *Cymatia bondorffi*, 3 spp. of Corixidae out of 19 Scottish spp. examined, possess terminal or sub-terminal heterochromatic knobs on the paired chromosomes during spermatogenesis. Association of non-homologous chromosomes is effected by fusion of the heterochromatic material, a fusion which takes place during early prophase and remains until 1st metaphase. There is evidence that relational coiling is partially arrested as a result of this process.—*H. D. Slack*.

1732. SUBRAMANIAM, M. K., and P. N. GANAPATI. Studies on the structure of the Golgi apparatus. I. Cytoplasmic inclusions in the gregarine *Lecudina brasili* (n. sp.) parasitic in the gut of *Lumbriconereis*. *Cytologia* 9(1): 1-16. 16 fig. 1938.—Granular chondriosomes increase from a scattered few in the intracellular phase of the parasite, to numerous granules in the adult trophozoite. In the same phases, the Golgi apparatus spreads from a few juxta-nuclear bodies to numerous scattered bodies. They increase by division. No relation exists between the central body and the Golgi bodies.—*H. Hubbard*.

1733. SUBRAMANIAM, M. K. Studies on the structure of the Golgi apparatus. II. Liver cells of *Rhacophorus maculatus* Gray. II. Some observations on the mechanism of secretion of Golgi bodies in the intestinal cells of *Lumbriconereis*. *Proc. Indian Acad. Sci. Sect. B* 7(2): 80-103; (3): 125-131. 1938.—II. It is suggested that the chromophobic or idiosomic component of vertebrate somatic cells occurs as a core in the Golgi substance. In the liver cells during activity, the core becomes differentiated inside the substance of the apparatus in various regions. Rupture and disintegration of the apparatus takes place in those regions where chromophobic areas have been differentiated, resulting in the formation of osmophil masses which have no visible chromophobic or idiosomic component in the vertebrate Golgi apparatus. This renders the comparison of secretion of various substances by the apparatus in vertebrates and invertebrates more logical.—

III. Two kinds of secretion have been observed in the alimentary canal cells of *Lumbriconereis*. In cells producing a watery mucous secretion the Golgi apparatus consists of granules and vesicles. Secretion vacuoles arise in contact with the chromophilic rim of Golgi vesicles. In cells producing the granular type of secretion 3 types of association between the Golgi bodies and the secretory product were observed: granules in intimate relation with

the idiosome of the Golgi batonettes; developing granules closely pressed against small Golgi vesicles; and typical Golgi batonettes, double rimmed batonettes and Golgi vesicles on the surface of a secretory granule. A theory regarding the operation of the Golgi apparatus is given which would bring into line the secretion of various substances in invertebrates and in vertebrates.—*M. K. Subramaniam.*

GENETICS

Editors: ORLAND E. WHITE, *Plant*; SEWALL WRIGHT, *Animal*

(See also in this issue Entries 1704, 1889, 1965, 2155, 2160, 2167, 2312, 2349, 2396, 2414, 2458, 2461, 2481, 2596, 2698, 2771, 2810, 2937, 2950, 2958, 2959, 2978, 3005, 3262, 3269, 3296, 3334, 3347, 3353, 3393)

GENERAL

1734. CHARLES, DONALD R., and HAROLD H. SMITH. Distinguishing between two types of gene action in quantitative inheritance. *Genetics* 24(1): 34-48. 1939.—Existing and new tests are compiled, with a uniform system of proof, for determining whether the data of a "quantitative character" cross are better interpreted in terms of arithmetic factor effects (with dominance) or of geometric factor action. In the former case the F_2 mean should be midway between the F_1 and the mid-value of the parent strains; each BC average should be midway between the F_1 and the parent strain; the "genetic" 3d moment of each BC should be zero. If the factor effects are geometric, the F_1 average should be the geometric mean between the parent strains, and the F_2 mean should ordinarily not be much larger; each BC average should be the geometric mean between the F_1 and the parent strain; the 2 BC's should have the same "coefficient of genetic variability," about 0.7 as large as that of the F_2 , and the same "coefficient of genetic third moment," about $\frac{1}{3}$ as large as that of the F_2 . Methods are given for calculating the coefficients of genetic variability and 3d moment of each segregating generation. Data of Lindstrom and of H. H. Smith on inheritance of tomato fruit size and tobacco corolla tube length are found, by all tests, to agree much more closely with the geometric than with the arithmetic factor action scheme.—*D. R. Charles.*

1735. HALDANE, J. B. S. Indirect evidence for the mating system in natural populations. *Jour. Genetics* 36(2): 213-220. 1938.—Statistical tests are given for appraising the randomness of mating of a given group of animals or plants through a consideration of the ratio of homozygotes to heterozygotes when (1) heterozygotes are directly distinguishable, and when (2) dominants must be tested for heterozygosity. The tests are applied to Ride's data on M and N agglutinogens in the Chinese (no dominance) and to Philip's data on wing and body color in *Dermestes vulpinus*, in which the frequency of heterozygosis was deduced from test matings. A formula is offered for estimating the amount of inbreeding when an excess of homozygotes occurs.—*B. S. Burks.*

1736. STURTEVANT, A. H., and K. MATHER. The interrelations of inversions, heterosis and recombination. *Amer. Nat.* 72(742): 447-452. 1938.—Inversions largely prevent effective recombination in heterozygotes. One result is that, in populations heterogeneous for sequence, the separate sequences will come to differ in the deleterious recessives they carry. Therefore more sequence heterozygotes will survive than would be the case with random mortality. There will be selection in favor of diversity of sequence. This raises the question, why is crossing over (and recombination) not regularly wholly suppressed? Analysis indicates that selection may operate to favor recombination as a means of maintaining the "flexibility" of the species under inconstant environmental conditions; but at least 3 different environmental situations must be assumed, each being recurrent and each decisive (at times) for the fate of at least one generation of individuals.—*A. H. Sturtevant.*

1737. WRIGHT, SEWALL. The distribution of gene frequencies under irreversible mutation. *Proc. Nation. Acad. Sci. U. S. A.* 24(7): 253-259. 1938.—This paper develops equations which must hold under equilibrium of

form in the distribution of frequencies of a gene subject to irreversible mutation. The formula of the distribution itself is derived for various cases, including the case in which mutation is reversible or, if irreversible, is opposed by strong selection, that in which there is no selection but opposed mutation rates of any magnitudes, and that in which the population is so small that mutation pressures have no effect on the form of distribution. The evolutionary significance of the results is discussed briefly.—*S. Wright.*

PLANT

1738. CHATTERS, R. M. Induction by fast neutrons of mutations in *Antirrhinum* and *Myosotis*. *Science* 88(2280): 241-242. 1938.

1739. CLARK, C. F., F. J. STEVENSON, and L. A. SCHAAL. The inheritance of scab resistance in certain crosses and selfed lines of potatoes. *Phytopath.* 28(12): 878-890. 3 fig. 1938.—The genetic behavior of resistance and susceptibility to common scab was studied in a number of crosses and selfed lines of potatoes. Green Mountain apparently breeds true for susceptibility to scab. Katahdin is susceptible, but carries at least 1 factor for scab resistance in a heterozygous condition. Hindenburg and Ostragis are probably homozygous for resistance, and seedling No. 44537 and Richter's Jubel are heterozygous. Russeting and resistance are linked. In one cross the genes for scab reaction were independent of those for red and white tuber colors. Russet, red and white-skin types have been produced that are highly resistant. Resistance to common scab can be combined with other characters of economic importance.—*Authors.*

1740. CLAUS, E. Die Zuckerrübenzüchtung von Heute. *Zentralbl. Zuckerrindst.* 46(41): 905-908. 1938.

1741. COOK, R. C. A note on embryo-rejuvenation. *Jour. Heredity* 29(11): 419-422. 1938.—Consists of pertinent comments and documented abstracts and excerpts from articles on metaxenia, neophysis and related phenomena. These are presented as having theoretical implications in the problem of "genetics of development" suggested by an accompanying article on asexual fruit development as found in *Citrus*.—*L. M. Dickerson.*

1742. DERMEN, HAIG. Detection of polyploidy by pollen-grain size. I. Investigations with peaches and apricots. *Proc. Amer. Soc. Hort. Sci.* 35: 96-103. 1 pl. 1937 (1938).—Pollen-grain samples of 121 vars. of peaches and 3 vars. of apricots were examined. Since no differences in pollen-grain size were detected in the samples and since all the vars. examined were derived from the same species, they are considered as diploids. In the pollen-grain samples of some vars. there were present in varying percentages diploid as well as tetraploid grains. When young trees of Fairs Beauty and Hiley vars. were brought into the greenhouse long before flowering time, the percentage of abortive pollen grains was increased and diploid as well as tetraploid grains were observed in the samples when such grains were either very few or absent in samples taken from trees growing in the orchard. Polyploidy may result from environmental changes affecting the production of σ as well as ρ gametes, or even the young embryos at the time of early development. The percentages of abortive and diploid pollen-grains of vars. examined are presented and photomicrographs of pollen-grain samples are shown.—*H. Dermen.*

1743. DOBZHANSKY, TH., and M. M. RHOADES. A possible method for locating favorable genes in maize. *Jour. Amer. Soc. Agron.* 30(8): 668-675. 2 fig. 1938.—The loss of vigor following inbreeding of maize strains is accounted for by supposing that most cross-pollinated strains are heterozygous for deleterious recessive genes that become homozygous due to selfing (Richey and Sprague). Proof of the correctness of this theory for maize is not available. Such evidence has been obtained in *Drosophila pseudoobscura* by means of a series of crosses described in the original paper; individuals homozygous for a given chromosome present in the natural population are obtained, and their viability compared with that of their sibs which are heterozygous for the same chromosome. Inversions preventing crossing-over and consequent disintegration of the chromosome tested are an essential part of the exptl. arrangement used. A similar procedure might be used also for the detection of the chromosomes carrying deleterious or favorable genes in maize. A preliminary attempt to secure inversions in maize that would suppress crossing-over in the chromosomes to be tested is necessary; this is difficult but probably not impossible. Inbred lines, or individual plants of cross-pollinated vars., will then be crossed to tester strains provided with inversions and dominant markers in various chromosomes. In the F_2 a comparison of plants homozygous and heterozygous for a given chromosome or chromosomes could then be made, and the lines with favorable genetic endowment isolated.—T. Dobzhansky.

1744. FONDARD, L., E. GERMAN, et F. CABASSON. Observations sur les blés de Provence. Fécondation croisée, rayons X, ondes courtes et mutations. *Compt. Rend. Assoc. Franç. Avanc. Sci.* 60: 254-257. 1936(1937).

1745. FROST, HOWARD B. Nucellar embryony and juvenile characters in clonal varieties of Citrus. *Jour. Heredity* 29(11): 423-432. 3 fig. 1938.—Both gametic and nucellar seedlings of most genetic types of Citrus are at first very thorny. Different grades of thorniness in the same young nucellar seedling clone tend to be propagable by budding. As thorniness declines the tendency to flower production and usually to fruit setting increases. These and other visible changes which characteristically occur with increase of clonal age, are of the same general nature as those which occur from youth to maturity in individual budded trees. The changes with age and the reverse changes in seed production are not genetic. The mechanisms which might bring about such changes are discussed.—H. B. Frost.

1746. HALDANE, J. B. S. Heterostylism in natural populations of the primrose, *Primula acaulis*. *Biometrika* 30(1/2): 196-198. 1938.—The ratio of thrum to pin plants among 2302 primroses did not differ significantly from equality. Individual populations did not diverge from equality to a significantly greater extent than could be expected as the result of sampling error.—J. B. S. Haldane.

1747. HODGSON, R. W., and S. H. CAMERON. Effects of reproduction by nucellar embryony on clonal characteristics in Citrus. *Jour. Heredity* 29(11): 417-419. 1 fig. 1938.—A comparison is presented of the behavior, under uniform conditions of environment, of 2 clones of the Paper Rind (St. Michael) sweet orange variety, one the original old clone and the other a young one derived therefrom by asexual seed reproduction, the parent clone exhibiting polyembryony. The major differences noted are, for the young clone, greater vigor, more upright growth habit, thorniness and lower seed content; for the old clone, earlier and heavier bearing. It might be possible to invigorate polyembryonic Citrus clones and reduce their seed content by propagation by nucellar embryony.—R. W. Hodgson.

1748. JOHNSON, L. P. V. Hybridization of Triticum and Agropyron. IV. Further crossing results and studies on the F_1 hybrids. *Canadian Jour. Res. Sect. C Bot. Sci.* 16(10): 417-444. 2 pl. 1938.—Results are given of hybridization work involving 27 *Triticum* forms and 18 *Agropyron* spp. Only 2 *Agropyron* spp., *A. glaucum* and *A. elongatum*, crossed successfully with *Triticum*. Several hundred F_1 plants were obtained. Hybrid seeds varied greatly in size; some were deficient in endosperm, others lacked the embryo. Seed germination and seedling nutrition were materially aided by use of 2 to 5% glucose sols. In general, *Agropyron* characters tended to be dominant in inheritance, particularly

in crosses involving *A. elongatum*. The dominance relations for important characters are: *Agropyron* dominance in perenniality, vegetative vigor, and extent of mature root; partial *Agropyron* dominance in general morphological type, shattering of rachis, adherence of glumes to seeds, and winter hardiness; intermediate inheritance in texture of mature root, size of seed, rigidity of leaf, and leaf pubescence. A method of root extraction is descr. in which plants are grown in special containers that permit reasonably normal root development and greatly facilitate extraction. F_1 plants of crosses involving *A. glaucum* are completely sterile, while in *A. elongatum* crosses a fair proportion are moderately fertile. Chromosomal associations and relative proportions of functional and non-functional pollen are discussed in relation to fertility. The more important results from similar work in Russia are outlined and discussed in relation to present results and future prospects of the investigation.—Auth. abst.

1749. LEDINGHAM, G. F., and W. P. THOMPSON. The cytogenetics of non-amphidiploid derivatives of wheat-rye hybrids. *Cytologia* 8(3/4): 377-397. 13 fig. 1938.—In the wheat-rye cross, all male cells are sterile, and less than .02% of the flowers set seed when pollinated naturally from surrounding plants. In these few cases thus obtained the chromosome number approximated 28 (wheat 21 + rye 7). Studies of 2d generation plants, however, showed that no rye characters bred true. Three chromosome groupings were obtained: 28 from parthenogenetically developing F_1 eggs, 42 from these same eggs fertilized with 14-chromosome wheat sperm (emmers), and 49 from the same eggs fertilized by 21-chromosome wheat sperm. All functional eggs resulted from a restitution process.—H. Hibbard.

1750. LESLEY, J. W. The midget tomato. A new gene mutant. *Jour. Heredity* 29(10): 393-394. 1 fig. 1938.—This mutant is conspicuous because of its small size and dense cushion-like growth habit which is due to the development of an unusually large number of axillary shoots. Usually the flowers were abnormal and no self-pollinated fruits were obtained. One fruit was obtained after pollination with pollen from a race containing recessive genes belonging to 6 linkage groups. F_2 and F_3 data indicate that midget is a simple recessive of low viability.—L. M. Dickerson.

1751. LINDEGREN, CARL C., and GERTRUDE LINDEGREN. Non-random crossing over in the second chromosome of *Neurospora crassa*. *Genetics* 24(1): 1-7. 2 fig. 1939.—Analysis of 4-strand crossing-over in the 2d chromosome showed the same type of non-randomness as the authors had already reported in the sex chromosome of *N. crassa*. Multiple crossovers involving only 2 of the 4 strands were most abundant and in excess of those calculated on a random basis. There was a slight deficiency of multiple crossovers involving 3 strands, and a marked deficiency of multiple crossovers involving all 4 strands.—C. C. Lindegren.

1752. MELCHERS, G. Die Auslösung von Blütenbildung an zweijährigen Pflanzen im ersten Sommer durch implantierte Reiser selbst nicht blühfähiger Kurztagpflanzen in Langtagbedingungen. *Naturwiss.* 26(30): 496. 1938.—Under long day conditions scions of the short day plants *Nicotiana tabacum* var. Maryland were grafted onto stocks of the biennial form of *Hyoscyamus niger* in its 1st year. The scions which themselves could not flower under long day conditions induced the stocks to bloom. This is difficult to reconcile with the hypothesis that one "flowering hormone" causes the change from the vegetative to the reproductive phase in all plants.—G. Sander.

1753. OBERLE, GEO. D. A genetic study of variations in floral morphology and function in cultivated forms of *Vitis*. *New York State [Geneva] Agric. Exp. Sta. Tech. Bull.* 250. 1-63. 1938.—Grape flowers are of 3 rather sharply defined types; viz., functionally hermaphroditic, functionally pistillate and functionally staminate. All types are morphologically hermaphroditic, however, in that flowers of each class have full complements of stamens and pistil. Unisexuality has resulted from abortion of either the ♂ or ♀ sexual elements occurring during a late stage of their development and always after meiosis. American spp. of *Vitis* are entirely dioecious in that only staminate and pistillate individuals occur. The same is true of all other

spp. of *Vitis* with the exception of European and Asiatic *V. vinifera*, which has functionally hermaphroditic as well as functionally pistillate and staminate forms. The 3 flower types are genetically determined. Abortion of the ♂ sexual elements, resulting in the unisexual pistillate type, is due to a recessive factor, *sp*. Abortion of the ♀ sexual element, resulting in the unisexual staminate type, is governed by a dominant factor, *So*. These factors are carried on the same chromosome and occupy positions which do not permit crossing over between them. The following genetical formulae are assigned to the various floral types: *so sp/so sp* = functional pistillate; *So Sp/so sp* = functional staminate; *so Sp/so sp* = heterozygous hermaphrodite; *so Sp/so Sp* = homozygous hermaphrodite; *So Sp/so Sp* = "derived" functional staminate. Crosses involving the various floral types exhibit simple Mendelian ratios. A few hermaphroditic individuals are homozygous for hermaphroditism in that when selfed or crossed with other hermaphroditic or pistillate individuals only hermaphroditic progeny result. Other hermaphroditic forms are heterozygous for hermaphroditism in that when selfed or intercrossed they give 3:1 ratios of hermaphroditic to pistillate offspring. When backcrossed to the double recessive pistillate form 1:1 ratios of hermaphroditic to pistillate progeny result. Staminate forms appear only in progeny from crosses involving a staminate parent. Mendelian ratios calculated for the various combinations of crosses show close agreement with observed ratios. Functional hermaphroditism is considered to have been the primitive floral type in *Vitis*. Unisexuality is phylogenetically younger and has been derived from the bisexual condition. A theory is presented which accounts for the evolution of dioecism from functional hermaphroditism.—G. D. Oberle.

1754. OEHLER, ERNST. Untersuchungen über die Behaarung des Halmes in Nachkommenschaften aus Weizen-Roggen-Kreuzungen. *Zeitschr. Zücht. Reihe A. Pflanzenzücht.* 22(3): 417-451. 8 fig. 1938.—Allogamic Petkus winter rye segregated about 3:1 as to hairy-neck, a dominant where pubescence is expressed as heavy, weak and zero. Inbred self-fertile hairy-neck rye strains showed 61.5% constancy. Segregating inbreds gave ratios similar to those obtained from plants, foreign pollinated, within the variety. The F_1 (self-sterile) generation carried proportions of about 4:2:4 of heavy, weak and zero, hairy-necks, in order. Self-fertile ryes were generally monogenic. The F_2 , from F_1 hairy-neck plants backcrossed to wheat, carried about 66% hairy-necks while in the F_2 to F_3 33% hairy-necks came from heavy hairy-neck parents, 20% from weak hairy-neck parents. Weak hairy-neck parents gave fewer heavy but more weak and zero plants than did heavy parents. The majority of offspring of a cross carried more zeros than hairy-necks. The individual F_2 to F_3 backcrossed families may be divided into 4 groups: families giving only hairy-necks, more hairy-necks than zeros, fewer hairy-necks than zeros, and only zeros. Families of group 2 split 3:1 or 3:2 and those of group 3 split 1:4 as to hairy-neck and smooth. In most of the offspring from crosses families generally split according to group 3. 7 families split as per groups 1 and 2. About $\frac{1}{2}$ of the individuals from groups 1 and 2 and $\frac{2}{3}$ from group 3 produced families constant in type of splitting. 7 crossing groups produced nearly constant lines but always a few zero plants appeared. Hairy-necks were in defect of culm length from 6 to 26 cm. compared to zero plants, the strong showing the greater defect. Speltoids had longer culms than the vulgare type. Hairy-neck speltoids had about the same culm length as the vulgare-type zeros. From the F_1 to F_3 backcrosses no correlation appeared between floret fertility and incidence of pubescence. From the F_1 to F_3 the 3 groups generally showed less fertility from heavy through medium to zero.—L. R. Waldron.

1755. PRAKKEN, R. Zwei verschiedene Fälle somatischer Spaltung in der Blütenepidermis heterozygoter Pflanzen. *Genetica* 20: 453-457. 1938.—A description of somatic segregation in flower color of *Nicotiana* and *Phaseolus* with possible explanations in terms of mutation, non-disjunction or somatic crossing over.—E. W. Lindstrom.

1756. SCHAD, C., and P. HUGUES. Hybrides "Blé X Seigle." Historique, obtention, stérilité et fertilité de l'hybride F_1 . *Ann. Épiphyties et Phytogénétique* 4(2):

235-265. 8 fig. 1938.—A dry climate appears to favor both natural and artificial crosses between wheat and rye. The var. of wheat is the most important factor, early sorts crossing more easily than late. Ease of crossing with rye behaves in some wheat vars. as a recessive character. The amphidiploids termed *Triticale* contain the whole chromosome complements of both parents.—W. V. L.

1757. TANG, Y. Certain statistical problems arising in plant breeding. *Biometrika* 30(1/2): 29-56. 10 fig. 1938.—The author considers from the statistician's point of view the problem of breeding new vars. of sugar beet. The breeder, with the purpose of increasing the sugar content, has to make a selection of vars. from a larger supply, multiply the seeds of those selected and compare them in field trials with some established standard. For economic reasons the breeder must ask: (1) whether he should select more vars. and, consequently, test them with fewer replications, or vice versa; and (2) what is the minimum number of replications necessary in field trials if he desires to have a fairly good chance of discovering a new variety which is actually better than the standard? To answer these questions is the main purpose of this paper.—P. L. Hsu.

1758. WETTSTEIN, W. v. Transgression und Heterosis bei Populus-Kreuzungen. *Forstwiss. Centralbl.* 60(17): 555-558. 2 fig. 1938.—Seedlings of *P. tremula* from Müncheberg (Prussia) cross-pollinated in the greenhouse with *P. tremula* from Zürich grew 13.1% taller in the 1st season than those with both parents from Müncheberg. Hybrids of *P. tremula* \times *P. tremula* v. *villosa* were 12.9% taller at the end of the season, those of *P. tremula* \times *P. tremuloides* 14.8% taller, and those of *P. alba* \times *P. tremula* 44.6% taller. Seedlings of the Müncheberg aspen flowering in the open on May 13 reached heights only 66.5% as great as those bred in the greenhouse Feb. 7.—W. N. Sparhawk.

1759. ANONYMOUS. Verslag over de werkzaamheden voor het iepenziekte-comité, verricht aan het laboratorium voor erfelijkheidsleer in 1937. [Report on the investigations for the elm disease committee conducted at the genetics laboratory at Wageningen during 1937.] *Tijdschr. Plantenziekten* 44(3): 155-160. 1938.—All crosses were made by N. Krythe. The weather in 1937 was bad during flowering and fruiting of the elms, and only a few of the crosses gave satisfactory results. Those made with flowers of isolated, cut branches kept in nutrient solns. in greenhouses were better.—H. L. G. de Bruyn.

ANIMAL (EXCEPT MAN)

1760. BEADLE, G. W., R. L. ANDERSON, and JANE MAXWELL. A comparison of the diffusible substances concerned with eye color development in *Drosophila*, *Ephestia* and *Habrobracon*. *Proc. Nation. Acad. U. S. A.* 24(2): 80-85. 1938.—Tests of extracts of wild type pupae of *Habrobracon* indicate the presence of substances showing effects, when tested in *Drosophila*, similar to the previously known v^+ and cn^+ substances. Similar tests of various eye color mutant types of *Habrobracon* suggest that the ivory locus in *Habrobracon* corresponds to the cinnabar locus in *Drosophila* and that the mutants ivory and cinnabar are parallel.—G. W. Beadle.

1761. BITTNER, JOHN J. Spontaneous lung carcinoma in mice. *U. S. Publ. Health Repts.* 53(50): 2197-2202. 1938.—The 2 most common types of cancer in mice are breast and lung neoplasms. By crossing inbred strains of mice having a very high and a very low incidence of these tumors it is possible to determine how they are transmitted—at least in mice. In this work the "A" strain of mice, showing a lung tumor incidence of approx. 80% in both sexes, was crossed to the "B" stock which has a lung cancer ratio of about 1%. The matings were made both ways: high cancer mothers \times low cancer fathers and high cancer fathers \times low cancer mothers. The ratio of 1st and 2d generation mice which developed pulmonary cancer was 76.5% and 56.6% respectively. No difference was observed in the progeny due to the type of mating. Comparison of these observed ratios with expected mendelian ratios suggests that susceptibility to spontaneous pulmonary cancer in mice is inherited as a single dominant character. The ability to transmit this type of cancer is possessed by the high lung tumor father as well as the high lung

tumor mother. Lung cancer in mice thus differs from breast cancer since breast cancer is only transmitted through the high cancer mother by what has been termed a "breast cancer-producing influence" present in the milk. By foster-nursing it is possible to increase or decrease the incidence of breast cancer; foster-nursing has no influence on the lung cancer ratio in mice.—*J. J. Bittner*.

1762. CHARLES, DONALD R. Studies on spotting patterns. IV. Pattern variation and its developmental significance. *Genetics* 23(6): 523-547. 7 fig. 1938.—The patterns of white-spotted mice have long been known to be rather diverse, even within presumably almost isogenic strains. The variability is limited, however; some regions of the skin bear pigmented fur in every individual; other regions always bear white fur, and it is only the intervening areas that have a variable behavior which may be characterized by the proportion of cases in which the hairs are pigmented. Counts were made of the proportion of animals bearing pigmented fur on each of 503 very small skin areas, in the presence of each of 6 combinations of "spotting" genes. The proportions so obtained ("pigmentation frequencies") vary systematically over the skin surface, in the presence of any one genotype, forming a gradient field which drops off from the ear and rump regions towards the feet, tail tip, and mid-lumbar region. The frequency fields of *ssKKEEFF* (4% of white fur), *ssKKEEff* (35%), *ssKkEeFf* (hybrid between 4% and 100% white strains) and *ssKkEeff* (35% × 100%) have the same general form but consistently different heights, the frequencies diminishing in the order indicated. Similarly the frequency field of *SSkkeeFf* (20%) is consistently higher than that of *Sskkeeff* (20% × 100%); but neither of these 2 falls into the previous series: both have a somewhat different form from the fields obtained in the presence of *ss*, lower in the anterior dorsum and head, higher on the post. dorsum and legs. The difference in shape of pigmentation frequency field between genotypes containing *KEF* without *S* and those containing *S* without *KEF* is taken to indicate that *KEF* and *S*, though both acting ultimately on pigmentation frequency, have different sorts of primary effect. The increase in pigmentation frequency of a given point from heterozygote to homozygote (*Sskkeeff* to *SSkkeeFf*; *ssKkEeFf* to *ssKKEEFF*) varies complexly with the value in the heterozygote. But if the pigmentation frequencies are subjected to an inverse probability transformation the values in heterozygote and homozygote are found to have an approx. linear relation. The transformation does not bring about an approach to constant difference between *Sskkeeff* and *SSkkeeFf*, although it does for *ssKkEeFf* and *ssKKEEFF*, which is taken to be a second indication of a difference in nature of primary effects between the (*KEF*) and *S* genes. Following Wright (1920) the frequency fields are considered in terms of some hypothetical material whose conc. *P* at a particular point of the skin must equal or exceed a minimal value *P₀* for the ultimate formation of pigment. Most aspects of the observed regional and genotypic variation of pigmentation frequency can be accounted for it is assumed that: (a) the *P* of a particular skin point varies somewhat from animal to animal of the same genotype; (b) the average value either of *P*, or of *P₀* or of both, in the presence of a given gene combination, varies systematically from point to point over the skin surface; (c) *K*, *E*, *F* have a constant additive effect on either *P* or *P₀* throughout the anterior and post. halves of the body, the ant. increment being nearly 3 times as large as the post.; (d) *S* has some sort of multiplicative effect on one of the 2 variables, *P* or *P₀*. As reported by Onslow (1915) but somewhat doubted from the results of subsequent workers, tyrosinase can generally be detected in extracts of skin which is forming pigmented hairs; but it is absent or greatly diminished in extracts of those skin regions of spotted mice which are forming unpigmented hairs.—*Auth. summ.*

1763. DANIEL, JANET. Studies of multiple allelomorph series in the house-mouse. III. A spectrophotometric study of mouse melanin. *Jour. Genetics* 36(1): 139-143. 1938.—Absorption curves of 10 points were made with a König-Martens spectrophotometer for melanin solns. made from hairs of 11 genotypes. 8 of these gave qualitatively identical results; the variations of the other 3

are believed insignificant. Evidence of chemical differences in melanin from different genotypes is lacking.—*E. C. MacDowell*.

1764. DAVID, LORNA THIGPEN. The effect of temperature on eye color in *Habrobracon juglandis* (Ashmead). *Amer. Nat.* 72(743): 574-577. 1938.—The effect of temp. was tested on the eye colors carrot, maroon, and the combination carrot-maroon in *Habrobracon*; limited expts. also were made with the eye color cantaloup and with the body color lemon. The temp. ranged from 37.2° C to around 15° C (cool cellar room, temp. not exact). Except for cantaloup, which showed little if any change, the intensity of the eye colors varied directly with the temp., in contrast to that of body color (type, also lemon), which varied inversely with the temp. Carrot showed wide variation, from white at low temp. to a deep reddish carrot at high temp.; maroon showed less variation, from a bright red to a dark red or black; and the combination carrot-maroon showed still less variation, from white to a pale yellow. "White-eyed" carrot wasps (*wh^c*) were phenotypically like genetically white eyed (*wh*). The bright red of the maroons (*ma*) was similar to the deep reddish orange of the carrots (*wh^c*). Body color was detd. earlier in development than eye color.—*L. Thigpen David*.

1765. DRY, F. W. The genetics of the Wensleydale breed of sheep. II. Colour, fertility, and intensity of selection. *Jour. Genetics* 33(1): 123-134. 1938.—Most white Wensleydale sheep, deep blue inside the ears, are heterozygous whites. Many animals pale inside the ears are homozygous whites. Monozygotic twinning, if it ever occurs, is rare. The average number of lambs per ewe put to the ram was 1.71. In Wensleydale crosses high fertility is transmitted by the rams to their cross-bred daughters. The Wensleydale color standard severely limits the intensity of selection for non-color characters which can be practised amongst ♀ breeding sheep.—*From auth. summ.*

1766. DUNN, L. C., and W. EINSELE. Studies of multiple allelomorph series in the house-mouse. IV. Quantitative comparisons of melanins from members of the albino series. *Jour. Genetics* 36(1): 145-152. 1938.—Gross melanin weight and size of melanin granules were detd. for various genotypic compounds of the 4 genes of the albino series combined with black and with brown. Weights were recorded for 13 genotypes including 3 to 20 determinations each; granules were measured from 8 genotypes represented by 272-1090 measurements each. Graded steps in hair color from black to white are accompanied by parallel graded reductions in melanin weight; differences in weight associated with differences in granule size rather than with change in number of granules. Authors conclude that mutations in albino series may be described as altering quantity of melanin, probably uniform throughout.—*E. C. MacDowell*.

1767. GRÜNEBERG, HANS. A reverse mutation in the rat (*Mus norvegicus*). *Jour. Genetics* 35(2): 177-181. 1937.—One agouti young among 50 offspring from 1 pair of non-agouti rats is believed to be due to a dominant mutation, since when found no other agouti young of comparable size were known to be in the colony and statistical probability of an unrecognized dominant epistatic black gene is very low.—*E. C. MacDowell*.

1768. HALL, C. S. The inheritance of emotionality. *Sigma Xi Quart.* 26: 17-27, 37. 1938.—Individual differences in emotionality, measured by the number of days over which defecation and urination persisted when rats were put into an open field 7 ft. in diam., are shown to be inheritable. The progeny of the 7 most emotional ♂♂ mated with the 7 most emotional ♀♀ of a large heterogeneous group eliminated on the average significantly more (♂♂ 4 days, ♀♀ 2.4 days) than the progeny of the 7 least emotional ♂♂ mated with the 7 least emotional ♀♀ (♂♂ 0.8 days, ♀♀ 0.07 days). The ♂♂ tended to be more emotional than ♀♀. Emotional rats were less active, and less stereotyped in their behavior, than non-emotional rats. Several hypotheses are presented. The significance of the results for psychotherapy is discussed, and the writer believes that although constitutional differences are modifiable, the degree of modification is limited and constitutional differences are of primary importance in the etiology of psychoses.—*J. McV. Hunt (courtesy of Psych. Abst.)*.

1769. HASKINS, C. P., and E. V. ENZMANN. A determination of the magnitude of the cell "sensitive volume" associated with the white-eye mutation in X-rayed *Drosophila*. III. *Proc. Nation. Acad. Sci. U.S.A.* 24(3): 136-141. 2 fig. 1938.—The method previously developed by the authors for the determination of the "sensitive volume" corresponding to the locus for white eye in *D. melanogaster* is applied to an analysis of temp. effects upon the apparent volume of this locus. Eosin stock was used, and data for ♂♂ and ♀♀ are presented separately. As would be expected, the data from ♀♀ are non-linear, and only those from ♂♂ are used in the calculation. Young larvae were irradiated at 4°C, 26°C, and 46°C. The radii of the corresponding sensitive volumes found, assuming the volume to be spherical as in previous cases, were respectively 6.39×10^{-7} cm., 6.52×10^{-7} cm., and 7.10×10^{-7} cm. The significance of these values and their deviations is discussed.—C. P. Haskins.

1770. HERSH, A. H., and F. DeMARINIS. Bar-eyed mosaics in *Drosophila melanogaster*. *Genetics* 23(6): 548-561. 1938.—Data on white bar-eyed mosaics recovered at 20°, 25°, and 30° C in *jBMn/w* flies and in *jBMn/wBB* flies at 25°, conform as an approximation to the power function, $y = bx^k$. (y is the number of white facets, x , the total facet number in the mosaic eye, b and k are constants.) The values of k for the 4 sets of mosaics in the order mentioned above are 3.86, 3.53, 1.76 and 2.81. As the order of eye size in any set increases the value of b decreases. The presence of Minute- n increases from 4 to 10 times the rate of mosaic formation over that found in the corresponding non- Mn flies of the same exps. The data favor the view that bar eye considered as a localized dwarfism is the result of a process of agenesis and not one of atrophy or autolysis as in the vestigial alleles. Although the time relations are unknown the inference can be drawn from the mathematical considerations that in *jBMn/w* mosaics there is a time during development which is the latest time for the change at the bar locus to wild type to result in an all-white eye. Up to this time the action of the bar factor is to depress the eye size by nearly 300 facets.—Auth. summ.

1771. HESTON, WALTER E. Bent-nose in the Norway rat. *Jour. Heredity* 29(11): 437-448. 1 fig. 1938.—Both nutritional and genetic factors influence the manifestation of bent-nose in the rat (*Rattus norvegicus*), a condition in which the bones of the rostrum are bent laterally. In 115 animals, progeny of *bent* × *bent* matings, fed a well-balanced stock ration, only one developed a bent-nose. In groups of animals from the same type of matings fed deficient rations in which the Ca-P ratio was imbalanced, percentages of bent-nose developed ranging from 45.45% to 64.91%, depending upon the ration used. Wistar rats and also those of the Hoppert stock were tested for bent-nose with the deficient diets. When fed deficient ration VII, 30.88% of the Wistar rats and 3.77% of the Hoppert stock developed the character as compared with 64.91% of the bent stock. Bents were out-crossed to Hoppert animals and F_1 and F_2 generations fed deficient ration VII. Of the F_1 's, 3.36% were bent-nosed while 11.73% of the F_2 's developed the character. This significantly higher incidence of bents among the F_2 's than among the F_1 's is evidence of segregations of genes. The low percentage of bents among the F_1 's indicates that in general the factors for bent-nose are recessive to normal.—W. E. Heston.

1772. HUTT, F. B., and P. D. STURKIE. Genetics of the fowl. IX. Naked, a new sex-linked mutation. *Jour. Heredity* 29(10): 370-379. Frontispiece. 4 fig. 1938.—A hereditary character, naked, which reduces the down of chicks and plumage of adults is described. Pterylosis is normal but the feathers do not erupt properly from their follicles. Remiges and rectrices are few or lacking. Naked fowls are distinguishable at all ages. The condition is caused by a sex-linked recessive gene, n , which on the average is lethal to about half of the affected chicks during the last 2 or 3 days of incubation. Among the naked chicks hatched mortality was 55% during the first 6 weeks of life. Homozygous ♂♂ are no more affected than hemizygous ♀♀. Cystine and cystine had no effect on the growth of feathers when fed in comparatively large doses. Skin transplants

indicate that the defect is localized in the feather follicles. Other conditions reducing the extent of the plumage in the fowl are discussed and it is suggested that the naked mutation is of recent origin.—F. B. Hutt.

1773. KIKKAWA, HIDEO. The "sump" method for *Drosophila* morphology. *Jour. Heredity* 29(10): 395-397. 3 fig. 1938.—There is a brief description of the procedures and illustrations of the results of a technique perfected by Dr. J. Suzuki, Imperial Sericultural Experiment Station, Tokyo, Japan, to whom the reader is referred for further information. Surface features are impressed on a thin celluloid surface and examined directly under an ordinary microscope with low intensity illuminations. The technique has been patented under American, British, French, German and Japanese governments.—L. M. Dickerson.

1774. KIMBALL, RICHARD F. A delayed change of phenotype following a change of genotype in *Paramecium aurelia*. *Genetics* 24(1): 49-58. 1 fig. 1939.—In *P. aurelia*, the mating type changes in definite ratios at endomixis. When a change occurs in genotype from type II to type I, some of the animals remain for a while type II. This is shown by the fact that, for a short time after endomixis, animals of both types are found in such changed caryonides. However, in these caryonides animals of either type give rise later on only to animals of type I. Therefore, these caryonides must be genetically type I. The presence of type II animals for a time after endomixis appears, then, to be due to a lag in the change of phenotype, not to a difference in genotype. The rate of the change of phenotype differs both for different animals of the same caryonide and for different caryonides. No lag was found for the change from type I to type II, possibly because it is too short to be detected. This case resembles certain other cases of lag in the change of phenotype found in *Paramecium* and in some Metazoa. The physical basis of the lag in the change of phenotype in *Paramecium* could be either a continued activity of the old macronuclear fragments or a delay in the change of the old cytoplasm under the influence of the new genotype.—R. F. Kimball.

1775. KOLLER, P. C. Genetics of natural populations. III. Gene arrangements in populations of *Drosophila pseudoobscura* from contiguous localities. *Genetics* 24(1): 22-33. 1 fig. 1939.—The frequencies of the gene arrangements in the 3d chromosome of *D. pseudoobscura* were detd. in populations inhabiting the different canyons of the Panamint Mountains. 6 gene arrangements are present in the populations, and their relative frequencies vary from canyon to canyon. Populations of adjacent canyons are somewhat more similar than those of the more remote ones. The geographical gradient may be due to migration, which, however, is not effective enough to level the differences between the canyons. The observed and expected frequencies of the inversion homozygotes and heterozygotes in the canyon populations are in agreement, indicating random mating and equal viability. Significant yearly variations were found in the populations of 2 localities, but were not observed in a 3d. The genetic differences between the canyon colonies, as well as yearly variations in the frequencies of the gene arrangements, are probably due to the smallness of the effective breeding size of these colonies. Local genetic diversification can arise in a population occupying a continuously habitable territory. How small the elementary breeding units are in such a territory remains to be determined.—Auth. summ.

1776. MARGOLIS, OTTO S. Studies on the bar series of *Drosophila*. V. The effects of reduced atmospheric pressure and oxygen on facet number in bar-eyed *Drosophila*. *Genetics* 24(1): 15-21. 1939.—Data on the effects of reduced atmospheric pressure and of a pure oxygen atmosphere on the development of facets in Bar-eyed *Drosophila* are presented. Flies which had spent varying portions of their egg-larval period (2-5 days) at one-half atmosphere pressure showed a very small, but for the most part statistically insignificant, decrease in facet number. Exposures to reduced pressure all took place before the beginning of the temp-effective period. Flies developed from larvae which had spent from the 24th to the 72d hour of development in a pure O_2 atmosphere at 28° showed a marked increase in facet number when compared with controls raised under

normal atmospheric conditions at 28°. A 2d group which had spent from the 48th hour of development to the 90th hour in O₂ showed a somewhat smaller but significant increase in facet number. Facet determining processes are evidently in operation before the beginning of the temp-effective period, that is, about 50 hours at 28°; and these can best be studied through the systematic use of new and controllable environmental variables such as the ones used here.—O. S. Margolis.

1777. MENDES, LUIZ O. T. Genetics of Dysdercus. I. Behavior of a melanic form of *D. mendesi* Bloete. *Jour. Heredity* 29(10): 387-389. 1938.—During investigation of *D. mendesi* as a cotton pest a melanic form heretofore unknown and of very rare occurrence in the field was found. A detailed genetical analysis indicated that the character is determined by a single pair of genetic factors (*mm*) recessive to the normal type (*MM*). The heterozygous individuals are phenotypically intermediate between the melanic and normal. The actual and expected results of all the crosses made are presented in tables which have been afforded supplementary publication as Document No. 1144 of the American Documentation Institute.—L. O. T. Mendes.

1778. MUNRO, S. S. A single chromosome explanation of Roberts and Quisenberry's Brahma Barred Rock mosaic. *Jour. Heredity* 29(10): 389-391. 1 fig. 1938.—The Brahma-Barred Rock mosaic reported in 1935 by Roberts and Quisenberry may perhaps be explained on the basis of non-disjunction of a single chromosome. To make this explanation valid it must be assumed that genes *E* and *F* are linked and that while $E > e$, $E < ee$. Under these conditions the Brahma side would contain 3 homologous chromosomes carrying the genes *FFeeE* and the Barred Rock side the 4th carrying *fE*.—S. S. Munro.

1779. PHILIP, URSULA. Mating systems in wild populations of *Dermestes vulpinus* and *Mus musculus*. *Jour. Genetics* 36(2): 197-211. 3 fig. 1938.—A well-defined population of *D. vulpinus*, consisting of a few thousand members caught from a pile of sheepskins, was mating at random; this was shown by testing the ratio of homozygous to heterozygous animals for a wing and a body-color factor, for which the species is polymorphic. Mice inbred from a population in a Scottish coal mine, comprising the types yellow-belly and grey-belly, revealed an unexpected lack of heterozygotes. The mice were evidently not mating at random, but breaking up into comparatively small mating units. This was corroborated by the fact that mice tested for heterozygosity for hidden recessives failed to segregate for any. From Dubinin's data it was concluded that there is no evidence for inbreeding in *Drosophila melanogaster*.—B. S. Burks.

1780. SCHARER, BERTA, and ERNST HADORN. The structure of the ring-gland (corpus allatum) in normal and lethal larvae of *Drosophila melanogaster*. *Proc. Nation. Acad. Sci. U.S.A.* 24(6): 236-242. 2 fig. 1938.—For the secretory activity of the ring-gland cells (pupation hormone) as suggested by Hadorn (1937) no histological evidence could be established. The ring-gland, or at least its greater part (large cells), is homologous to the corpora allata found in other insects. The question of a homology between the small ring-cells and the corpora cardiaca (Pflugfelder) is discussed. During the larval development of *Drosophila* the growth of the ring-gland (corpus allatum) takes place by an increase in the size of the cells. In the grown-up 1st-larvae the ring-gland as well as its cell elements is considerably smaller than normal. Retardation in puparium formation of the 1st-larvae is apparently due to underdevelopment of the corpora allata.—From auth. summ.

1781. STEINBERG, ARTHUR G., and MORTIMER ABRAMOWITZ. The Bar "locus" and the *v*⁺ reaction in *Drosophila melanogaster*. *Proc. Nation. Acad. Sci. U.S.A.* 24(3): 107-111. 1938.—The Bar alleles and their heterozygotes with + were implanted into vermilion. There is an apparent but not entirely consistent correlation between facet number and ability to form the *v*⁺ substance, i.e., smaller eyes show less + pigmentation. It is suggested that the facet reducing reaction system is not the same as that affecting pigment formation. Evidence is offered which indicates that the ability of a fragment to form the

v⁺ substance is a function of its size and of the portion of the disc from which it arises.—Auth. summ.

1782. SURRARRER, T. C. On the inheritance and expression of a mottled-eyed mutant in *Drosophila melanogaster*. *Genetics* 23(6): 631-646. 4 fig. 1938.—Mottled acts as a recessive and is very sensitive to temp. Adults with the mottled character erased because of development at 25°C or above produce progeny with mottling expressed if the pupae develop at suitable temps. Mottled is on the 3d chromosome as located by the dominant physiologically balanced stock *S/CyD/C* IIIX. This is further confirmed by linkage data. By 3-point linkage data the mottled character was placed at 5.46 crossover units from Dichaete and 11.87 units from Stubble. It thus involves the region of the spindle fiber attachment. Mottled is a rather stable nuclear change, and not a result of somatic elimination or mutation. The temp. effective period falls between 25 and 35 hours after pupation at 27°C. The expression of mottled occurs 91 to 97 hours after pupation (24 hours at 27°C and the remaining development at 18°C). The vermilion coloration occurs between 109 and 112 hours after pupation (24 hours at 27°C and the remaining development at 18°C).—Auth. summ.

1783. WALETZKY, EMANUEL. The interaction of some wing mutants in *Drosophila melanogaster*. *Genetics* 24(1): 8-14. 5 fig. 1939.—Combinations of bifid with 5 Beadex alleles produce a disproportionate combination effect upon wing size, shape, and venation. Area and length measurements of normal, bifid, Beadex, and bifid Beadex wings show that this effect is much greater than a simple summation of the independent effects of these mutants, and that other factors besides peripheral degeneration influence the formation of Beadex and bifid Beadex wings. Bifid also interacts disproportionately with scalloped, but not with cut-6.—E. Waletzky.

1784. WHITING, P. W. The induction of dominant and recessive lethals by radiation in *Habrobracon*. *Genetics* 23(6): 562-572. 1938.—Dominant lethals may be induced in the sperm of *Habrobracon* by X-radiation of the ♂♂. At 10,000 to 20,000 r units all sperm have at least one lethal. With very high dosages, 41,000 to 142,000 r, some sperm are directly inactivated while many still remain active and able to carry dominant lethals into the eggs. Reduction of biparental sons and of daughters takes place at the same rate. Recessive lethal-bearing daughters of treated ♂♂ were twice as numerous as non-lethal bearing. Linkage with segregating visible mutants is sometimes indicated. Treatment of ♀♀ causes reduction in offspring per day, due either to the induction of dominant lethals or to direct killing of eggs. No change in sex ratio would be caused by dominant lethals in the egg. If ♀♀ are treated and subsequently mated, there is no appreciable reduction in ♂ ratio, indicating that few, if any, recessive lethals are induced in the egg. Treatment of mated ♀♀ causes a radical lowering of ♀ ratio indicating that more dominant lethals are induced in the sperm than recessive lethals in the egg.—Auth. summ.

MAN

1785. BOJLEN, K., and T. BREMS. Hypertelorism (Greig). *Acta Path. et Microbiol. Scand.* 15(3): 217-258. 17 fig. 1938.—The literature is reviewed and occurrence of 11 cases among 24 members of the same family is described. Hypertelorism appeared through 5 generations as an hereditary deformity, transmitted as a dominant; the primary factor is apparently an anomalous development of the prosencephalon.—J. F. Wilkinson.

1786. GOTTSCHALDT, K. Über die Vererbung von Intelligenz und Charakter. *Fortschr. Erbp. Rassenhyg. u. ihrer Grenzgebiete* 1(1): 1-21. 1937.—A critical review, with bibliography, of studies on the inheritance of mental traits.—M. L. Earle.

1787. HABS, HUBERT. Zur Frage der Erbbedingtheit der Abderhaldenschen Fermentabbaureaktion. *Zeitschr. Mensch. Vererbungs- u. Konstitutionsl.* 21(5): 672-675. 1 fig. 1938.—The Abderhalden reaction was investigated in 40 pairs of twins (20 monozygotic and 20 dizygotic, 10 under 16 and 19 under 18 years of age). The decomposition values of the different endocrine glands showed better concordance among monozygotic than among dizygotic twins. The reac-

tion was apparently dependent upon inherited factors.—*I. Dordick.*

1788. HALDANE, J. B. S. The location of the gene for haemophilia. *Genetica* 20: 423-430. 1938.—A theoretical consideration of 2 hypotheses to explain the frequency of the gene for hemophilia in man which is constantly being selected against. The author favors the recurrent mutation concept, which he compares with Sirks' idea of crossing over between the X and Y chromosomes (like bobbed in *Drosophila*) whereby a recessive hemophilia gene in the ♂ X chromosome could be protected by the normal allele in the Y chromosome, reducing the selection pressure against hemophilia.—*E. W. Lindstrom.*

1789. HOLSTI, Ö., and A. J. HUUSKONEN. Heredo-familial arthritis. *Acta Med. Scand. Suppl.* 89: 128-138. 1 fig. 1938.—A study of 33 members of 4 generations of an arthritic family. In the first 3 generations there were 12 arthritics but none in the 4th generation (all under 8 years of age).—*J. F. Wilkinson.*

1790. JARCHO, SAUL, and PAUL M. LEVIN. Hereditary malformation of the vertebral bodies. *Bull. Johns Hopkins Hosp.* 62(3): 216-226. 5 fig. 1938.—This paper presents clinico-pathologic reports of 2 cases, in one generation of severe malformation of the bodies of cervical and thoracic vertebrae.

1791. LEY, A. Sur alexie d'évolution familiale et héréditaire. *Ann. Méd.-Psychol.* 96(2): 145-150. 1938.—A father and 3 children all suffered from alexia. Although they were normal otherwise, making an adequate social adjustment and being able to calculate and to copy forms, they were unable to learn to read in school. The oldest child, after leaving school, suddenly learned to read at the age of 17. The 2 younger children, aged 13 and 9, were still in school and learned so much of their readers by heart that their deficiency was not obvious until they were asked to read isolated words in unfamiliar material.—*M. B. Mitchell (courtesy of Psychol. Abstr.).*

1792. LI, S. Y. Congenital cataract. *Chinese Med. Jour.* 54(3): 277-282. 1938.—Six of a family of 8 children had congenital cataract though the 3 generations preceding them were without eye trouble.—*C. D. Stevens.*

1793. NUSSEY, A. M. A piebald family. *Biometrika* 30(1/2): 65-67. 1 pl. 1938.—A piebald family, the 4th to be published in England, is recorded. A typical representative of the family is described and the tree covering 5 generations (3 of which are complete) is analyzed.—*A. M. Nussey.*

1794. PFEIFFER, RICHARD. Die angeborene Verrenkung des Speichenköpfchens als Teilerscheinung anderer kongenitaler Ellenbogengelenkmisbildungen. *Zeitschr. Mensch. Vererbungs- u. Konstitutionsl.* 21(4): 530-545. 11 fig. 1938.—The dislocation of the head of the radius, hitherto regarded as inherited, is only a symptom of a general elbow dislocation; abnormalities in the ulna and radius, regarded as primary, frequently accompany the inherited dislocation of the radius, and can even produce an essentially similar additional dislocation of the ulna towards the humerus. The appearance of inherited dislocation of the radius is often accompanied by other elbow malformations in definite families and thus indicates a close relationship of apparently different forms of inherited abnormalities of the elbow. The familial occurrence of osteochondritis dissecans indicates the existence of an endogenously produced local injury of the cartilage of the entire elbow. Thus dislocations of the elbow may be the result of a primary disturbance in growth and differentiation which, through purely chance circumstances leads to a luxation of the head of the radius and less frequently to a luxation of the elbow. Also subluxation and borderline conditions can be subsumed under such a general germinal disturbance.—*I. Dordick.*

1795. POPENOE, PAUL. Heredity and education. *Ohio Jour. Sci.* 38(4): 207-210. 1938.—In addition to differences in rate of maturation, sex differences particularly concern the parent educator. Widespread findings of genital infantilism and decline in IQ among highly intelligent young women indicate that the biological problems of adolescence are not being handled satisfactorily. Constitutional differences such as those between introverts and extraverts also need more educational attention.—*P. Popenoe.*

1796. RATH, BRUNO. Rotgrünblindheit in der Calm-

bacher Blutsippe. Nachweis des Faktorenaustauschs beim Menschen. *Arch. Rass.- u. Ges.-Biol.* 32(5): 397-407. 1938.—The first demonstration of crossing-over in a human pedigree is claimed by the author for this study of hemophilia and color-blindness in a German family.—*P. Popenoe.*

1797. RIDDELL, W. J. B. A haemophilic and colour-blind pedigree. With Addendum by J. B. S. HALDANE. *Jour. Genetics* 36(1): 45-51. 1 fig. 1938.—The present 6-generation pedigree resulted from the marriage of a hemophilic to a member of a color-defective family. Haldane points out that the pedigree contains 1 woman who is heterozygous both from hemophilia and color-blindness, these being derived from different parents. Her only son does not show crossing-over.—*B. S. Burks.*

1798. RIFE, D. C. Simple modes of inheritance and the study of twins. *Ohio Jour. Sci.* 38(6): 281-293. 1938.—Formulae are given for determining the ratios of concordant and discordant pairs of fraternal twins, where only a single pair of hereditary factors is responsible for the variations. Tables are also given, showing the expected ratios at various gene frequencies, for the various types of inheritance involving only a single pair of factors. Calculations, based on the frequencies of the blood group and the M and N genes, show that approximately 39% of fraternal twins, in North American whites, should be concordant in respect to blood groups and the M and N reaction.—*D. C. Rife.*

1799. SCHADE, H. Erbbiologische Bestandsaufnahme. *Fortschr. Erbpäth. Rassenhyg. u. ihrer Grenzgebiete* 1(1): 37-48. 1937.—A review of the promotion, in Germany, of genetic surveys of the population such as first proposed by Schallmeyer in 1891, with special mention of the decrees which control these surveys promulgated since 1933 when the state recognized that biologic knowledge concerning population was an essential focal point of politics. Those researches which deal either with the methods or with the specific results and which have been carried out principally during 1935 and 1936 are referred to and there is a bibliography. The reports are considered under the following headings: state surveys, including the various decrees and means taken for the establishment of central files, general surveys of certain populations, psychiatric surveys, surveys for the determination of the presence of specific characteristics, and anthropologic surveys. The state surveys are treated at greatest length beginning with the work of Gütt (1935) on the unification of public health administration and the establishment by the newly created centers for advice on heredity and race betterment of a genetic file, and it is shown by what means these earlier decrees have been added to and broadened and so made to include examination of larger numbers of the people, and the procedure for securing and keeping the archives of heredity.—*M. L. Earle.*

1800. SOUTHWICK, WALTER E. The kindred file. Its value for genetical studies of defective individuals. *Jour. Heredity* 29(10): 398-400. 1938.—Information concerning the relatives of institutionalized individuals is essential for any causal study of human deficiencies. To facilitate the collection of such information, a method has been devised which consists essentially of a system of filing cards on which would be recorded the data concerning certain pre-listed traits with one card for each individual. The unit of filing for these cards would be the kindred. Such a file would provide facilities for the ready and direct recording of all information concerning the relatives of institutionalized individuals, and would markedly expedite further study of human characteristics.—*W. E. Southwick.*

1801. THEN BERGH, HILDEGARD. Die Erbbiologie des Diabetes mellitus. *Arch. Rass.- u. Ges.-Biol.* 32(4): 289-339. 1938.—Studying 147 pairs of twins, the author confirmed the general conclusion that diabetes is determined by a simple recessive factor. Detailed histories of 22 pairs are published with photographs and a review of the literature.—*P. Popenoe.*

1802. WORSAAE, E. Thomsens Vier-Gen-Hypothese Erläutert Durch Untersuchungen von Familien mit Neugeborenen Kindern. *Acta Path. et Microbiol. Scand. Suppl.* 37: 594-598. 1938.—Investigation of the parents and their

new-born children in 89 families of group A gave results agreeing with Thomsen's Four-Gene-hypothesis.—J. F. Wilkinson.

1803. ANONYMOUS. Sterilization law in Finland. *Eugenical News* 23: 47-48, 1938.—Finland's efforts to curb propagation of feeble-minded individuals date back to 1686. Her 1935 law permits sterilization of an idiot, a feeble-minded or an insane person, "if it is feared that his mental deficiency may be transmitted to his offspring or that his offspring will remain without support by reason of his

incapacity." It may also be applied to certain criminals and to those of unnatural sex instinct. Upon application of the patient, sterilization may be permitted in the case of deaf-mutism, epilepsy, congenital blindness, Huntington's chorea, spinal ataxia, cerebral ataxia, muscular atrophy, spastic spinal paralysis, certain congenital malformations, hemophilia (carriers), and if heredity is evident, alcoholism and psychopathy. The Medical Board grants permission and specifies the method to be used.—M. V. Louden (*Courtesy Psych. Abst.*).

BIOMETRY

JOHN W. GOWEN, *Editor*

(See also in this issue Entries 1664, 1757, 1866, 1869, 1876, 2500, 2678, 3170)

1804. BAYLY, B. de F. Gauss' quadratic formula with twelve ordinates. *Biometrika* 30(1/2): 193-194, 1938.—The author gives the numerical values to 13 decimal places of the constants of Gauss' quadratic formula based on 12 ordinates.—E. S. Pearson.

1805. BJERKE, BJ. Sammanregning av observasjoner. II. [Mathematical treatment of observations.] *Meld. Norges Landbrukshøiskole* 18(1/2): 98-111, 1938.

1806. BRANDT, A. E. Tests of significance in reversal or switchback trials. *Iowa Agric. Exp. Sta. Res. Bull.* 234: 57-87, 1938.—The author proposes two statistical tests of significance adapted to the results of reversal or switchback trials. One is a modification of "Student's" *t*-test and the other a method of analysis of variance. Identical results may be obtained by either method when but one attribute of the exptl. units is measured, but when one or more other measures relevant to the exptl. results are to be examined through the use of covariance the latter method must be used.—E. C. Elting.

1807. BUROS, OSCAR K. Research and statistical methodology books and reviews 1933-1938. 100p. Rutgers University Press: New Brunswick, New Jersey, 1938.—The author has compiled reviews of statistical books from 1933-1938,—an occupation which turns out to be informative and entertaining. Reviews on the same volume are often laudatory, derogatory and vacuous according to the school of the reviewer. The author leaves the reader to calculate the means, variances, correlations of opinion.—J. W. Gowen.

1808. CHAPMAN, R. A. Applicability of the *z* test to a Poisson distribution. *Biometrika* 30(1/2): 188-190, 1 fig. 1938.—100 samples of 16 values were drawn experimentally from a Poisson distribution with mean equal to 1. Each sample of 16 was divided into 4 equal subsets. For each sample 2 estimates of the variance of the population were computed, i.e., variance between means of subsets and variance within subsets. The distr. of the ratio of these 2 variances, or *F*, was compared with the theoretical distr. Agreement between actual and theoretical frequency of *F*, as measured by χ^2 , was satisfactory. $P(\chi^2)$ was about 0.5.—R. A. Chapman.

1809. FINNEY, D. J. The distribution of the ratio of estimates of the two variances in a sample from a normal Bi-variate population. *Biometrika* 30(1/2): 190-192, 1938.—The distribution of this ratio has been investigated by Bose (1935) by a method dependent on term-by-term integration of infinite series. The simplicity of his result suggested the possibility of the more direct approach given below, which is followed by the evaluation of the probability integral for the distribution. It is then shown how, by a simple transformation of existing tables, a test of significance may be applied when the population correlation coefficient is known, and how the test may be adapted when only a sample estimate of this correlation is available.—D. J. Finney.

1810. GOULDEN, C. H. Methods of statistical analysis. 2nd ed. rev. 209p. Burgess Publishing Co.: Minneapolis, 1937.

1811. HEY, G. B. A new method of experimental sampling illustrated on certain non-normal populations. *Biometrika* 30(1/2): 68-80, 1 fig. 1938.—Sampling is effected by punching both original data and random numbers on to Hollerith cards. Sorting and tabulating machines take

random samples and compute the various statistical parameters for each sample with great speed. The method is used to demonstrate on certain non-normal populations, both actual and artificial, that the distribution of the estimates of the correlation and regression coefficients in samples from a bi-variate population where the correlation is high, is not seriously affected by departures of the original population from normality. This also applies to Fisher's "*z*" in conditions corresponding accurately with those in a Randomised Block expt. The method can easily be extended to the distribution of other parameters.—G. B. Hey.

1812. KENDALL, M. G. A new measure of rank correlation. *Biometrika* 30(1/2): 81-93, 1938.—A coefficient is proposed for the measurement of the relationship between 2 rankings of the same set of objects. The coefficient is easy to calculate and has a natural interpretation. To permit a judgment of significance the distribution is given of the values of the coefficient obtained by correlating a given ranking with all possible rankings. The distribution tends rapidly to normality as the number of ranks increases.—M. G. Kendall.

1813. LAWLEY, D. N. A generalization of Fisher's *z* test. *Biometrika* 30(1/2): 180-187, 1938.—A quantity *Z*, which is a generalization of Fisher's *z* for multivariate populations, is defined and its sampling distribution is found. It is shown how this provides a suitable statistical test for certain generalized analysis of variance problems, and a numerical example is given. The application of the test to the problem of regression of a set of dependent variates on another set of independent variates is also discussed.—D. N. Lawley.

1814. NEYMAN, J. A historical note on Karl Pearson's deduction of the moments of the binomial. *Biometrika* 30(1/2): 11-15, 1938.—A recent misstatement of R. A. Fisher's regarding Karl Pearson's knowledge of the standard deviation of a binomial has led the author to examine some early work of Pearson's of 1895 dealing with a suggested method of fitting a binomial series to a frequency distribution.—J. Neyman.

1815. OTTESTAD, PER. Notes on statistical methods of growth studies. *Cons. Perm. Internat. Explor. Mer Rapp. et Procès-Verbaux Réunions* 108(1): 9-12, 1 fig. 1938.—Various formulae for comparing growth rates are discussed.—F. N. Clark.

1816. PEARSON, E. S. The probability integral transformation for testing goodness of fit and combining independent tests of significance. *Biometrika* 30(1/2): 134-148, 4 fig. 1938.—This paper draws attention to the somewhat novel character of the problem to be faced in dealing with statistical tests based on the probability integral transformation (see work of R. A. Fisher, Karl Pearson and J. Neyman). The intuitional notions that have often served to determine the most appropriate test when dealing with normal variation are hardly applicable when, as in this case, we are concerned with a transformed variable following the rectangular distribution. The tests proposed by the 3 authors referred to are discussed, and emphasis is laid on the need for consideration of the possible alternatives to the hypothesis tested. Some illustration of the ideas involved is given in the case where the hypothesis regarding the form of a probability law $p(x)$ is incorrect,

(a) in the position of the mean, (b) in the magnitude of the standard deviation, (c) in the shape of the probability curve.—*E. S. Pearson.*

1817. PEARSON, E. S. Some aspects of the problem of randomization. II. An illustration of "Student's" inquiry into the effect of "balancing" in agricultural experiments. *Biometrika* 30(1/2): 159-179. 6 fig. 1938.—This paper discusses in some detail one aspect of the problem dealt with in "Student's" (the late Mr. W. S. Gosset's) last paper. The main point in question was that in agricultural experiments "balanced" arrangements would have the following advantage over "random" arrangements: while being less likely to detect the presence of small differences, they would seem to be somewhat more likely to detect the larger and therefore more important differences. The author of the paper expresses the position in algebraic form, relating it to certain theoretical work of Neyman and Pearson concerning the "power" of the test of a statistical hypothesis. He also makes further use of A. W. Hudson's uniformity trial data, quoted by "Student."—*E. S. Pearson.*

1818. WELCH, B. L. On tests for homogeneity. *Biometrika* 30(1/2): 149-158. 1938.—Results are obtained throwing light on the range of applicability of the normal theory distribution of the correlation ratio to cases where the normal theory conditions are not satisfied. The index of dispersion used to test the homogeneity of binomial series is treated as a special case. A procedure is suggested for dealing with the situation where the χ^2 distribution can no longer be applied owing to the smallness of the sample sizes.—*B. L. Welch.*

1819. YULE, G. U. Karl Pearson's lecture notes on the theory of statistics. *Biometrika* 30(1/2): 198-203. 1938.—This article contains a summary, taken from notebooks, of the subjects dealt with in Karl Pearson's lectures at University College, London, during the sessions 1894-96, on the Theory of Statistics. The author was one of 3 students who attended what was, perhaps, the first university course ever given on the modern theory of statistics. The summarising of the lectures is preceded by some general comments and recollections.—*E. S. Pearson.*

ECOLOGY

Editors

W. C. ALLEE, *Terrestrial Animal Ecology*
G. D. FULLER, *Terrestrial Plant Ecology*
CHANCEY JUDAY, *Hydrobiology (Oceanography, Limnology)*

FREDERICK A. DAVIDSON, *Ecology of Wildlife Management—Aquatic*
W. L. MCATEE, *Ecology of Wildlife Management—Terrestrial*

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Sexual selections, 1693; Mosquitoes in Lapland, 3202; Sex reversal in oysters, 3296; Mite-sponge commensalism, 3313; Zoogeography of Madagascar, 3343; Host-induced modifications in scale insect, 3347; Flight capacity in grasshoppers, 3365; Invasion of fresh water by marine fauna, 3381; Ecol. of European Coregonidae, 3396. [PLANT ECOLOGY]: Spitzbergen algae, 2791; Fresh water Rhodophyceae, 2794; Floristic areas in Rhodesia, 2894; Phytogeography of Madagascar palms, 2899; Myrmecodia, 2916; Seleniferous soil of U. S., 2925; Climate effecting grapes, 3013; Micro-climatology of cotton fields, India, 2931; Nutrient elements in rainfall, 2938; Vegetation and plant communities of Belgium, 3026; Climate and vegetation of W. Germany, 3031)

GENERAL

1820. ÄLVIK, GUNNAR. Über Lichtabsorption von Wasser und Algen in natürlichen Gewässern. *Bergens Mus. Arbok Naturvidenskabelig Rekke* 1937(2, paper 2): 1-63. 15 fig. 1937(rec'd 4-2-38).—The absorption of light in various natural waters in West Norway was studied by means of rectifier (selenium) photo-cells and glass color filters. The transmission for the total light (700-400 mμ) as thus measured was in the salt fjord water about 80% per metre, and in brown fresh water (humus water) about 35%. In the oyster-pools the transmission of total light was 30-80% per m. Ordinarily the surface fresh-water layer was optically distinguishable from the salt water lying below it in the pools. In the salt fjord water the maximum of transmission is for green light, around 530 mμ and in humus water in the red orange around 620 mμ, and is usually found between these limits. As the total transmission decreases the region of opt. transmission shifts from blue to red. Measurements were made of the light absorption of algae in different waters. Thus suspensions of *Chlorococcum submarinum* and *Chroococcus limneticus*, both oyster pool algae, showed high transmission around 720 mμ and the former gave good transmission also at 530-560 mμ, but heavy absorption at 550-450. The latter gave a more uniformly decreasing absorption. Results are tabulated showing the relation between the transmission of various algal pigments and the water.—W. R. G. Atkins.

1821. BAYLISS, L. E. The photographic method for recording average illuminations. *Jour. Marine Biol. Assoc. United Kingdom* 23(1): 99-118. 3 fig. 1938.—The chief sources of error in the method are due to (a) the uncertainty of the wedge constant, and (b) the failure of the reciprocity law. P.O.P. emulsion is shown to obey the reciprocity law sufficiently closely for exposure times between 1 and 24 hr. Gaslight paper should only be used for exposure times less than 1 hr. When P.O.P. is used, and a sheet of diffusing glass is placed above the wedge, the value of the wedge constant is sensibly independent of the direction and quality of the incident light. P.O.P. has a maximum sensitivity to light of wave-length 480 mμ, gaslight paper to light of 370 mμ. Factors are evaluated for converting photographic measurements of illumination into visual units. The method has an exptl. uncertainty of about ± 5 to ± 10 p.c., but is sufficiently reliable for use in the field.—L. E. Bayliss.

1822. BLAIR, W. F., and T. H. HUBBELL. The biotic districts of Oklahoma. *Amer. Midl. Nat.* 20(2): 425-454. 1 fig. 1938.—Three major biotic areas—each with a distinctive Orthopteran and Mammalian fauna—occur in Oklahoma. The major biotic areas are divided into biotic districts, which are distinguished by characteristic physiographic features and plant associations, by characteristic species and races of Orthoptera and mammals, and by characteristic assemblages of species of Orthoptera and mammals. Thus the eastern deciduous forest in Oklahoma is divided into the Ozark, Ouachita, Mississippi, and Cherokee Prairie districts. The Great Plains grasslands are divided into the Mixed-grass Plains, Mesquite Plains, and Short-grass Plains districts. The southern Rocky Mountains are represented by the Mesa de Maya district. The Osage Savanna district is an area of transition from the eastern deciduous forest to the Great Plains grasslands. The

Orthoptera and mammals of Oklahoma agree in showing little north-south zonation, but marked east-west zonation, indicating that precipitation and not temp. is the most important factor controlling (although indirectly) the distribution of these groups in the state.—W. F. Blair.

1823. CHAPMAN, V. J. Studies in salt-marsh ecology. Sections I to III. *Jour. Ecol.* 26(1): 144-179. 18 fig. 1938.—The physiography, tides, behavior of the water table, the aeration of the soil and the drainage of some salt marshes are descr. in considerable detail. There are diurnal movements of the water table and also cyclic movements associated with spring tidal cycles. The upper soil layers always contain a definite aerated layer in which are the roots of the plants. The composition of the occluded gas varies considerably. The factors determining the diurnal movements are: height of tide, resistance of soil strata, strength and direction of wind, height of marsh, distance from creek and size of creek, difference in level between tide and water-table. Water movement is detd. by lateral seepage, downward drainage, surface evaporation, transpiration, and surface flooding.—V. J. Chapman.

1824. DARLINGTON, P. J. Jr. Was there an Arch-atlantis? *Amer. Nat.* 72(743): 521-533. 1 fig. 1938.—Three genera (*Stylulus*, *Limnastis*, and *Perileptus*) of Carabid beetles which have been cited by Jeannel as evidence of a Tertiary land bridge (Archatlantis) from the Old World to the West Indies, appear really to have crossed the Atlantic through the air, not over land. The minute size of the insects, the apparent E. to W. direction of their dispersal, and the fact that 2 of the 3 genera have relatives on the isolated Hawaiian Islands all point to dispersal by winds. Neither terrestrial vertebrates nor the most recent comprehensive geological study (of C. Schuchert) appear to yield any real evidence of a Tertiary Archatlantis. It is concluded that there was no such land bridge.—P. J. Darlington, Jr.

1825. MOHR, E. C. J. Climate and soil in the Netherlands Indies. *Bull. Colon. Inst. Amsterdam* 1(4): 241-251. 1938.

1826. WITOLD, ADOLPH. Frühjahraspekte der Bienen in Ponary bei Wilno. [In Polish with Ger. summ.] *Trav. Soc. Sci. et Lettr. Wilno Cl. Sci. Math. et Nat.* 11: 1-23. 1937(rec'd 7-6-38).—From April 12 to June 1, 1933, various spp. of bees visiting flowers in Ponary (near Wilno) were observed in connection with the time of blooming of various species of plants. 73 spp. of bees were noted: 38 spp. were eliminated, because their appearance was considered accidental. Tables are given indicating the time relationship of various species of visiting bees to the species of plants blooming during the period of investigation.—M. H. Haydak.

ANIMAL

1827. BASSINDALE, R. The intertidal fauna of the Mersey Estuary. *Jour. Marine Biol. Assoc. United Kingdom* 23(1): 83-98. 1 pl. 1938.—The Mersey Estuary consists of an upper basin and an open bay joined by a deep channel. Of the 37 square miles of intertidal banks half occurs in the upper basin and half in the bay. Four-fifths of the total area is of sand and the remaining fifth (most of which is situated in the upper basin) is of mud. The densely inhabited banks of the upper basin are mainly composed of mud, are situated high up in the shore zone and are

inhabited by large numbers of a few species notably *Nereis diversicolor*, *Macoma balthica* and *Corophium volutator*. The densely inhabited banks of the bay are of muddy sand, are situated in sheltered places near low water mark and are inhabited by a large variety of species.—*R. Bassindale*.

1828. DEGERBÖL, MAGNUS. A contribution to the investigation of the fauna of the Blosseville Coast, East Greenland, with special reference to zoogeography. (The Scoresby Sound Committee's 2nd East Greenland Expedition in 1932 to King Christian IX's Land.) *Meddelelser om Grönland* 104(19): 1-36. 1 pl., 1 fig. 1937.—Until 1932 this coast was practically uninvestigated from a zoological point of view. The country between Angmagssalik and Scoresby Sound contains several zoogeographical boundaries, in particular in the neighborhood of Wiedemann's fiord, lat. 68° 30' N.—Species belonging to several animal groups, viz. land mammals, butterflies and beetles (1 exception), have their boundaries of distribution on this coast. In the case of land mammals and butterflies these boundaries are southerly, in the case of beetles and the only known land snail *Vitrina angelicae*, northerly. Within the said area there is a transition from the continental, dry, high arctic Northeast Greenland climate to the oceanic subarctic, Southeast Angmagssalik climate. It seems that more mobile forms, such as land mammals and possibly butterflies, have immigrated into Greenland at a late post-glacial period from Arctic America. But forms occur, e.g., the wingless *Otiorynchus arcticus*, which must be presumed to spread very slowly. The occurrence of these forms, which are of European origin, cannot possibly be explained except by supposing an earlier and then probably interglacial land-connection with Europe.—*M. Degerböl*.

1829. FYFFE, R. V., and F. J. GAY. The humidity of the atmosphere and the moisture conditions within mounds of *Eutermes exitiosus* Hill. *Australia Council Sci. and Indust. Res. Pamph.* 82: 1-22. 9 fig. 1938.—Direct and indirect methods for measuring relative humidity within the mounds are descr. and the indirect method, that of measuring the moisture content of inner wall material, is elaborated. The inner wall material was found most constant in its physical composition and hence least variable as to moisture content and gave reliable information as to moisture relations obtaining within the mound. Results by both methods show a relative humidity in the inner mound of rarely less than 92% and usually 95%, i.e., the vapor pressure deficit probably does not exceed 2 mm. The high humidity is maintained despite a high diurnal and seasonal range in temp., and an external vapor pressure deficit which frequently exceeds 20 mm. In spite of the irregular loss of moisture from the surface of the mound and the independent, and also irregular, production of moisture by the metabolism of the termites, a constantly high humidity is maintained within the mound by reason of features in the structure and composition of the mound. In spite of changing temp. within the mound free water does not occur where the termites are regularly congregated and this is explained as due to the temp. maintained by the living termites and the special properties of the mound material. "The system balances the amount of water produced by metabolism by the amount lost by diffusion and evaporation and provides a buffer mechanism to compensate variations in the rate of production and loss."—*S. F. Light*.

1830. KENNEDY, CLARENCE HAMILTON. The present status of work on the ecology of aquatic insects as shown by the work on the Odonata. *Ohio Jour. Sci.* 38(6): 267-276. 1938.—A brief review of the literature on ecology of dragonflies covering: physiological spp., hybrid spp., population counts, reproductive ability, distribution limited by place of oviposition and by habits of larva, water temps., taxonomy of immature stages, food of dragonflies, predators on dragonflies, ecological distribution, ebb and flow of a population. Suggested methods of approach. Bibliography of key literature.—*C. H. Kennedy*.

1831. MAYER, KAREL. Zur Kenntnis der Buchenhöhlen-fauna. *Arch. Hydrobiol.* 33(3): 388-400. 5 fig. 1938.—Five cavities containing 100-5000 cc. of water were studied in a beechwood near Pressburg. From June to Aug. the temp. by day in the water was lower and more constant than the air temp. Fauna lists are given; *Cyclops vernalis* and

Simocephalus congener were certainly breeding in one hole; the dominant organisms are the larvae of the diptera *Metriocnemus martinii* which overwinters as a larva and emerges in May, of *Aedes geniculatus*, and of the beetle *Prionocyphon serricornis*. A division of aquatic habitats in plants into Phytotelmata and Dendrotelmata is proposed. In the former, in leaf bases, the existence of the biotope is limited to a few months, the diurnal temp. changes are great, the most characteristic organism is the larva of *Dasyhelea bilineata*. In the latter the biotope may exist for some years. Diurnal variations in temp. do not exceed 4-8° C, the characteristic inhabitants in Central Europe are *Prionocyphon serricornis*, *Metriocnemus martinii*, *Dasyhelea lignicola*, *D. sensuata*, *D. obscura*, *Myiatropa florea*, *Aedes geniculatus*, *Anopheles nigripes*, *Habrotrocha thienemanni*. A complete list of species recorded from the Dendrotelmata, and from the Phytotelmata (in *Angelica* and *Dipsacus*) of Central Europe is given.—*G. E. Hutchinson*.

1832. NORRIS, K. R. A population study of the red-legged earth mite (*Halotydeus destructor*) in Western Australia, with notes on associated mites and Collembola. *Australia Council Sci. and Indust. Res. Pamph.* 84: 1-23. 10 fig. 1938.—Three generations of *H. d.* occur during a season at Guilford, Western Australia. The shape of the population graph varies considerably with the nature of the vegetation: The maximum population occurs in spring (Sept.-Oct.), when the survival rate is much higher than in earlier parts of the season (May-Aug.), owing to the fact that much more plant shelter is available. The population graphs for *Smynturus viridis* may differ widely for different situations and also for the same situation in successive years. The numbers of *Biscirus lapidarius* are shown to have a probable relation to those of *Smynturus*, accounting, at least in part, for a rapid decline in the numbers of springtails at the end of the season.—*Auth. summ.*

1833. PAVISIĆ. Über die Ökologie der Baumhöhlen-mückenlarven in Jugoslawien. *Arch. Hydrobiol.* 33(4): 700-705. 8 fig. 1938.—Felling of old trees may increase the number of breeding places by decay of the centre of the stump, followed by adventitious growth of small branches that protect the cavity from light and evaporation. 12 tree trunk holes are described, with drawings. *Aedes ornatus* is absent only where the water is richest in tannin; with it *Ae. echinus* is found. *Anopheles nigripes* is absent from the cleanest water, so that after a hole fills with water a succession may occur; first *Ae. ornatus* then *An. nigripes*. A relation between tannin content and seta length is noted in the latter species. *Orthopodomyia albionensis* is considered the only characteristic inhabitant of the permanently filled and colonized, better protected, holes.—*G. E. Hutchinson*.

1834. STANLEY, JOHN. The egg-producing capacity of populations of *Tribolium confusum* Duv. as affected by intensive cannibalistic egg-consumption. *Canadian Jour. Res. Sect. D Zool. Sci.* 15(10): 300-306. 1938.—Exps. are described in which adults of *T. confusum* are maintained at 27° C, and 75% relative humidity in 4 flour media: (a) ordinary whole wheat flour sifted through 76-mesh bolting cloth, (b) similar flour with 30-135 *Tribolium* eggs per g., (c) sifted whole wheat flour plus 3% of finely ground wheat germ and (d) flour + germ + eggs. When large numbers of eggs are eaten, there is a serious decline in egg production unless wheat germ in excess is also present. This is apparently due to a scarcity of certain accessory growth substances found in wheat germ but not to the same extent in eggs. When ground wheat germ is present, the beetles seem to do somewhat better in the presence of eggs, possibly because of a better water supply, obtained from the eggs.—*Auth. abst.*

PLANT

1835. ATKINS, W. R. G. The disappearance of *Zostera marina*. *Jour. Marine Biol. Assoc. United Kingdom* 23(1): 207-210. 1938.—The suggestion that the enfeeblement of *Zostera marina* due to lack of sunshine in 1931-2 is the fundamental cause of the epidemic is not supported by the meteorological data available from 1897 onwards, or by the known extinction coefficients of the water.—*W. R. G. Atkins*.

1836. BILLINGS, W. D., and W. B. DREW. Bark factors affecting the distribution of corticolous bryophytic communities. *Amer. Midl. Nat.* 20(2): 302-330. 8 fig. 1938.—Bryophytic communities were mapped on the butts of virgin forest trees in eastern Tennessee. Bark samples were also taken at specified heights on these trees and used to determine field moisture content, water-holding capacity, rate of drying-out, rate of absorption from a saturated atmosphere, and acidity of the bark. Communities of *Neckera pennata*, *Anomodon attenuatus* (and its facies of *Anomodon rostratus*), *Campylopus chrysophyllum*, *Brachythecium oxycadon*, and *Fissidens cristatus* were confined to the barks of deciduous trees. Communities of *Ulotia crispa*, *Dicranum fulvum*-*Bazzania denudata*, *Hypnum reptile*, *Bazzania trilobata*, and *Mnium hornum* were exclusive to the bark of *Tsuga canadensis*. The differences in distribution are ascribed to the differences in bark characteristics of deciduous trees and *Tsuga*, the bark of the latter being much more dry and more acid. Moisture content gradients, increasing from the upper part of the butt downward, were found to exist, resulting in a zonation and slow succession of bryophytic mats as the individual trees aged.—W. D. Billings.

1837. BLAKE, S. T. The plant communities in the neighbourhood of Coolm. *Queensland Nat.* 10(6): 106-113. 2 pl. 1938.

1838. GLOVER, P. E. The utility of aerial photographs as an aid to botanical survey. *Jour. S. African Bot.* 4(2): 35-44. 3 pl. 1938.—Phillips and several of his students, aided by aerial photographs, carried out investigations on the ecology of the flora in relation to the geology and other factors of the region, on a farm near Oberholzer on the West Rand; a region of broad undulating valleys between parallel ridges of E-W. strike. The flora is divisible into 3 main ecological types:—(a) Grasslands of 3 types I. More or less undisturbed grassland on flatter, less stony country; II. Grassland on stony regions such as hill slopes; III. Grassland on the site of some recent or remote disturbance. (b) *Protea* (et al.)-Open woodland. (c) *Acacia* (et al.)-Scrub. Conclusions:—Aerial photographs aid Botanical Survey considerably when used as maps, giving a bird's-eye view of the country under investigation. Old lands and other disturbed sites, difficult to discern on the ground, were easily recognizable on the photographs as dark lines showing plough furrows, by abrupt changes in color, or changes in tint. With experience scrub types can be recognized by the size and density of the dark spots shown on the photographs. Mixed and Undisturbed Veld can be recognized as even, homogeneously colored areas. Cloud shadows are occasionally a hindrance. The line of strike of a dyke, indiscernible on the ground, often shows clearly on the photographs. In this area, vegetation types did not adhere appreciably to different geological strata, though they tended to appear fairly consistently on the same aspects, especially *Protea* communities. This fact depends on factors such as protection from wind, local rainfall, fire, cold, soil moisture, and soil pH. With experience, certain vegetation types can be recognized on aerial photographs.—P. E. Glover.

1839. HOWELL, JOHN W. A fossil pollen study of Kokomo bog, Howard county, Indiana. *Butler Univ. Bot. Stud.* 4(9): 117-127. 1938.—The lower eleven feet of deposits show that a typical Canadian type of coniferous forest dominated by *Abies* and *Picea* was the pioneer after the soil was uncovered by the glaciers. *Pinus* is the only other genus represented in the lower 7 feet of deposits but *Larix* is present in the deposits 8 feet from the bottom. 12 feet from the bottom *Abies* and *Picea* lose dominance in favor of *Quercus* and *Betula*. 15 feet from the bottom *Betula* begins to lose out and *Quercus* retains undisputed dominance to the surface, never being approached by any other genus. *Abies* and *Picea* drop out entirely a few feet after their dominance is lost but *Pinus* remains in low frequencies to the first foot below the surface. *Larix* continues until within 12 feet of the surface and then disappears. Broad-leaved trees in addition to those above mentioned were *Acer*, with a maximum of 10% in 10-foot level; *Carya*, 25% maximum at the 7-foot level; *Fagus*, 5% maximum in the 2-, 4- and 11-foot levels; *Juglans*,

12% maximum at the 1-foot level; *Populus*, 13% maximum in the 2-foot level; *Salix*, 9% maximum in the 19-foot level; *Tilia*, 5% maximum in the 10-foot level; and *Ulmus*, 16% maximum in the 16-foot level. The following forest succession is shown: *Abies-Picea*, *Abies-Picea-Larix*, *Quercus-Betula*, *Quercus-Carya*, *Quercus-Betula*, *Quercus-Juglans-Carya*.—R. C. Friesner.

1840. HYDE, M. B. The effect of temperature and light intensity on the rate of apparent assimilation of *Fucus serratus* L. *Jour. Ecol.* 26(1): 118-143. 7 fig. 1938.—When light is not a limiting factor, the rate of apparent assimilation of submerged fronds of *F. serratus*, detd. as the amount of dissolved O₂ liberated (by Winkler's method), increases with rising temp. to a maximum value at 25-30°C, after which the rate decreases. There is a maximum at 5°C, with a secondary max. at 25°, if the light is low (600 lumens). For any one temp., increase in light intensity from 600 to 15,840 lumens causes a progressive increase in the apparent assimilation rate, which, for any one light series, is greater at high temps. than at low ones. The capacity of *F. serratus* still to show a rising assimilation curve with increase of light intensity up to the equivalent of $\frac{3}{4}$ total daylight (16,000 lumens), causes it to be classed as a sun plant.—M. B. Hyde.

1841. MITCHELL, G. F. On a recent bog-flow in the County Wicklow. *Sci. Proc. Roy. Dublin Soc.* 22(4): 49-54. 1 pl. 1938.—An area of peat 6 feet deep and 100 by 60 yards on a slope at an elevation of over 2,000 feet flowed out over the peat below (probably in 1937) exposing patches of the underlying granite. The slope of the lower portion is 8°, that of the upper 11°, while above it is 14°. A pressure ridge of peat may have formed allowing the peat on the steeper portion to slide out on top of that on the gentler slope below. The vegetation of the flow and of the extensive peat area surrounding it contains *Sphagnum*, *Eriophorum*, *Empetrum*, *Calluna*, *Scirpus caespitosus*, and *Vaccinium myrtillus*, but the lower layers of peat are dry and the bog is firm underfoot. The stream originating in this peat was not abnormally swollen or changed with peaty material at the time of the slide. Other peat flows have occurred in the vicinity and such bursts may occupy a definite position in the cycle of development of bogs resting on sloping surfaces.—G. B. Rigg.

1842. NEUWOHNER, WERNER. Der tägliche Verlauf von Assimilation und Atmung bei einigen Halophyten. *Planta* 28(4): 644-679. 24 fig. 1938.—Gas exchange in *Honckenya peploides*, *Salicornia herbacea* and *Cakile maritima* was studied by the methods of Harder, Filzer and Lorenz and as used by Guttenberg and Buhr.—Halophytes do not differ from glycophytes in principle but the former are much less efficient than the latter. Perhaps their specific plasma structure which conditions their salt-resistance limits their productivity and speed of growth. Halophytes thus cannot stand the competition of glycophytes in glycolic (sweet) soils.—B. R. Nebel.

1843. OTTO, JAMES H. Forest succession in the southern limits of Early Wisconsin glaciation as indicated by a pollen spectrum from Bacon's Swamp, Marion county, Indiana. *Butler Univ. Bot. Stud.* 4(8): 93-116. 1938.—This bog is within 25 miles of the southern border of Early Wisconsin glaciation. Results of pollen analysis of peat and marl showed forest succession from *Abies-Picea* dominance in early post-glacial time to *Acer-Fagus-Quercus* climax of the present. The former genera dominated the lower 12 feet of deposits but dropped suddenly at the 20-foot level in favor of broad-leaved genera dominated by *Quercus*. *Pinus* appears at the 29-foot level and persists to the top. A maximum of 23% appears at the 12-foot level. This is followed by a sudden reduction for the next 9 feet and a slight increase in the upper 3 feet. *Abies* disappears at the 11-foot level followed by *Picea* in the 10-foot level. The upper 10 levels mark the appearance of *Acer* and *Fagus* followed by an increase in frequency to a position of dominance. Forest succession suggests the following climatic periods: cool moist, moderate dry, warm with increased dryness, and warm moist.—R. C. Friesner.

1844. RICHARDS, RUTH REBEKAH. A pollen profile of Otterbein Bog, Warren County, Indiana. *Butler Univ. Bot. Stud.* 4(10): 128-140. 1938.—Otterbein bog is located

near the western border of Indiana in Warren County, at the very edge of Deam's Lake Region and Prairie areas. The depth of the bog was 44 feet. Indication of forest dominance was as follows: 44 to 35, foot-levels, *Abies*, *Picea*, *Pinus*; 34 to 33, *Salix*, *Quercus*, with *Abies* and *Picea*; 32 to 28, *Quercus-Ulmus*; 27, *Quercus-Ulmus-Acer*; 26 to 21, *Quercus-Ulmus-Carya*; 20 to 13, *Quercus-Carya-Acer*; 12 to top, *Quercus-Carya-Ulmus*. *Abies* and *Picea* disappeared abruptly at the 34-foot-level and *Salix* showed a marked dominance at the 34-foot-level. *Pinus* persisted to the surface layer. *Quercus* was the most important genus from the 32-foot level to the surface.—J. E. Potzger.

OCEANOGRAPHY

(See also in this issue Entry 3303)

1845. COOPER, L. H. N. Salt error in determinations of phosphate in sea water. *Jour. Marine Biol. Assoc. United Kingdom* 23(1): 171-178. 1938.—The yellowing, which may occur during phosphate determinations in sea water by Denigès' ceruleomolybdenic method, is attributed to hydrolytic products of complex molybdenyl halides. When 1 ml. of the standard acid molybdate reagent is used per 100 ml. of water, addition of Cu as recommended by Kalle reduces the development of color in sea water samples and distilled water standards to the same extent. The correction factor applying both to comparison by daylight in Hehner cylinders and to determinations in the Pulfrich photometer with the red S72 spectral filter is 1.12. However when 2 ml. of the reagent is used, the factor is dependent on the manner of making comparison. With daylight in Hehner cylinders it is 1.35; in the photometer with the red filter it is only 1.19.—L. H. N. Cooper.

1846. COOPER, L. H. N. Redefinition of the anomaly of the nitrate-phosphate ratio. *Jour. Marine Biol. Assoc. United Kingdom* 23(1): 179. 1938.—The anomaly is redefined as the amount by which the nitrate-phosphate ratio in the sea differs from 15, each salt being expressed as mg-atoms and phosphate being corrected for salt error by the appropriate factor (see preceding abstract).—L. H. N. Cooper.

1847. COOPER, L. H. N. Phosphate in the English Channel, 1933-8, with a comparison with earlier years, 1916 and 1923-32. *Jour. Marine Biol. Assoc. United Kingdom* 23(1): 181-195. 1938.—At Station E1, 22 sea miles south-west from Plymouth, the winter maximum for phosphate, representing the stock available for plant growth in the following spring, averaged 0.67 mg.-atom/m³ for the winters 1923-4 to 1928-9 and only 0.47 mg.-atom for 1930-1 to 1937-8. This fall in phosphate shows a close correlation with the abundance of summer spawning young fish and runs parallel with a decrease in the easting of the residual current at the Varne lightship in the Straits of Dover. Conditions of production in the individual years are discussed. The efficiency of utilization of the total stock of phosphate varies from year to year. In 1935 it was only 63%, in 1931, 93%. Between Feb. and May, the phosphate consumption averaged over 9 years was twice as great as it was in mid-Channel. High surface phosphate values are attributed to decomposition of floating organic material.—L. H. N. Cooper.

1848. GRAHAM, MICHAEL, and J. P. HARDING. Some observations on the hydrology and plankton of the North Sea and English Channel. *Jour. Marine Biol. Assoc. United Kingdom* 23(1): 201-206. 1 fig. 1938.—An hydrological section running from the northern North Sea through the southern North Sea and along the English Channel showed the same main features in the spring of 3 successive years, 1935-1937. High phosphate at the northern end is due to accumulation under a thermocline, at the southern end to oceanic influence. High phosphate off the estuary of the River Thames is probably due to sewage. The distribution of plankton (Copepoda, *Chaetoceros*, *Coscinodiscus*, *Rhizosolenia*, *Phaeocystis*) was characteristic, and similar in the 3 years.—M. Graham.

1849. HICKLING, C. F. The distribution of phosphates in the south-western area in April, 1938. *Jour. Marine Biol. Assoc. United Kingdom* 23(1): 197-200. 1 fig. 1938.—A survey of the distribution of the phosphates in the sea in the south-western area of England shows that the

surface water was poorer in phosphate than the deeper water, and that there were 3 regions where phosphate was exceptionally plentiful. This distribution was associated with the water movements on the one hand, and with the consumption of the phosphate by diatoms, on the other.—C. F. Hickling.

1850. TATTERSALL, W. M. The seasonal occurrence of Mysids off Plymouth. *Jour. Marine Biol. Assoc. United Kingdom* 23(1): 43-56. 1 fig. 1938.—An analysis of the Mysids found in a series of bottom tow-nettings taken at 3 stations in the Plymouth area over a period of one year. Two marked maxima in the numbers of Mysids were observed: a summer maximum in July and Aug., composed entirely of *Leptomysis gracilis*, mainly breeding adults, and a winter maximum in Dec. and Jan., due mainly to immature specimens of *Schistomysis ornata* and *Anchialina agilis*, and also to 2 spp. of *Gastrosaccus* and *Neomysis longicornis*.—W. M. Tattersall.

LIMNOLOGY

(See also in this issue Entries 1831, 3284, 3396)

1851. DAILY, WILLIAM ALLEN. A quantitative study of the phytoplankton of Lake Michigan collected in the vicinity of Evanston, Illinois. *Butler Univ. Bot. Stud.* 4 (6): 65-83. 1938.—Total plankton showed maxima in June and Oct., both being due primarily to diatoms. These were accompanied by pulses of each of the dominant diatom genera. Different spp. of the same genus of phytoplankton were usually much unlike in numbers at the same time of the year. The classes in order of numerical abundance were: Bacillariophyceae, Chrysophyceae, Myxophyceae, Chlorophyceae, and Dinophyceae. The curve for Bacillariophyceae is essentially similar to that for total phytoplankton; the curve for Chrysophyceae shows maxima in July and Nov.; that for Myxophyceae shows primary maximum in Sept. and secondary maximum in June. The remaining classes were never abundant. Factors appearing to affect periodicity were: turbidity, hours of sunlight, and temperature, though the last named did not seem to be of primary importance in diatom periodicity. Bacterial periodicity seems to be correlated with that of the algae and generally follows the latter with a lag.—R. C. Friesner.

1852. GRAF, HERBERT. Beitrag zur Kenntnis der Muschelkrebse des Ostalpengebietes. *Arch. Hydrobiol.* 33 (3): 401-502. 3 pl., 7 fig. 1938.—33 spp. are recorded; references being given to the systematic and ecological accounts of all previous workers in the region. 13 spp. are high alpine, occurring over 1900 m.; the highest habitat for ostracods being the Jöri-see, alt. 2500 m., and containing *Cypria ophthalmica*, *Candona candida*, and *Cyclocypris ovum*. Temp. is believed to be the most important ecological factor in determining seasonal and altitudinal distribution within the region. All spp. are classified as cold stenotherm, frigophil, eueurytherm, thermophil and warm stenotherm. The most widespread high alpine spp. are the eueurytherm *Cy. ophthalmica* (19 high stations), the frigophil *Candona candida* (9 stations) and the eueurytherm *Cyclocypris ovum* (8 stations) and *Heterocypris incongruens* (6 stations); less abundant, but almost confined to the high alpine zone are the cold stenotherm *Potamocypris zschokkei* (6 stations in all, 5 over 1900 m.) and *Eucypris fuscata* (5 stations in all, 4 over 1900 m.). 4 of 5 of the perennial eueurytherm spp. occur over 1900 m., none of the frigophil or cold stenotherm spp. are exclusively summer forms, even at high altitudes, no thermophil or warm stenotherm spp. are high alpine. 20 spp. are found in the littoral of lakes; of these *Candona candida*, *C. neglecta* (sometimes predominantly profundal), *Cyclocypris laevis* (rarely profundal), *Cytherina lacustris* (predominantly sublittoral) and *Limnocythere sancti-patricii*, extend to the profundal. *Heterocypris incongruens*, apparently a euryoxybiot form, is characteristic of temporary waters, though 24 spp. have been recorded from such habitats. *Cypria ophthalmica* is recorded from humic, and iron-rich waters and from sulphur springs; it is clearly highly eurytopic; other spp. from such habitats are listed. Certain preferences for various types of substrate are noted, deposits poor in organic matter are poorly colonized, but in general the

ostracods are eurydaphic and the nature of the vegetation in a locality has but little importance.—*G. E. Hutchinson.*

1853. KOLISKO, AGNES. Über die Nahrungsaufnahme bei *Anapus testudo* (Chromogaster testudo Lauterb.). *Internat. Rev. Ges. Hydrobiol. u. Hydrogr.* 37(4/5): 296-305. 10 fig. 1933.—The food of *A. testudo* consists chiefly of peridinians and its mouth parts are adapted for feeding on them. The various structures involved in the feeding process are descr.; of special interest is a knife-like projection which aids in holding the peridinian. *Anapus* pierces the wall of the peridinian and sucks out the cell contents. There was a definite correlation between the abundance of *A. testudo* and that of *Ceratium hirundinella*, on which it was feeding, in Lower Lunz Lake during the time of this investigation.—*C. Juday.*

1854. RÜTTNER, F., und F. SAUBERER. Durchsichtigkeit des Wassers und Planktonschichtung. Einige Beobachtungen in den Lunzer Seen. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 37(4/5): 405-419. 4 fig. 1933.—Measurements were made at a series of depths down to 28 m. using Pettersson's transparency meter. These showed that at certain seasons the lake-water was of very variable transparency. Thus it might show sharp minima in transparency at 6 and 12 m. in July, or in Dec. might remain constant down to 10 m. and then fall sharply to 14 m., near bottom. The curves so obtained show a close correspondence, in the inverse sense—like mirror images—with those obtained by plotting the total number of organisms, in thousands per cc., against the depth. The effect, with a light path of 1 m., is not very noticeable with a population density of a few hundreds per cc. With several thousands the effect is easily recognisable, and is very striking with several ten thousands per cc. It is hoped that it may be possible to differentiate the effects due to various organisms and mineral matter by determining the absorption in different parts of the spectrum by means of color filters.—*W. R. G. Atkins.*

1855. SEGERSTRÅLE, SVEN G. Studien über die Bodentierwelt in südfinnländischen Küstengewässern. IV. Bestandesschwankungen beim Amphipoden *Corophium volutator*. *Acta Soc. Fauna et Flora Fennica* 60: 245-255. 1 fig. 1937(rec'd 7-14-38).—In the bottom material of Krogarviken Bay, C. v. varied from 4 to 5429 individuals per sq. m., during 1928-1931. Especially interesting was the enormous reduction in numbers found from May 1929 to June 1930, due probably to a disease, the presence of which was indicated by brown patches on different parts of the body.—*T. v. Brand.*

1856. WELCH, PAUL S. A limnological study of a bog lake which has never developed a marginal mat. *Trans. Amer. Microsc. Soc.* 57(4): 344-357. 1 fig. 1933.—The major physicochemical conditions at Munro Lake, Michigan, extending over 10 summers, are descr. About 120 net plankters are listed. The list shows: (1) many genera compared with the number of species; (2) more phytoplankters than zooplankters; (3) limited number of diatoms and copepods; and (4) numerical prominence of the Chroococcaceae, Desmidiaceae, Protozoa, Rotifera and Cladocera. Quantitative net-plankton studies during the summer season show: preponderance of the phytoplankton; large quantities of *Microcystis*; more Protozoa and Rotifera than other groups of zooplankton; small quantity of diatoms; restricted quantities of Cladocera and Copepoda in the zooplankton; and restricted nature of the whole plankton. The bottom fauna is now much reduced. Sphaeriidae and *Corethra* are the numerically dominant groups. 18 spp. of fish are recorded from the lake. Biological productivity is much reduced. The lake is now in a senescent stage. Bottom encroachment is the sole cause of basin reduction; marginal encroachment is absent. Sediments are almost wholly autochthonous.—*P. S. Welch.*

WILDLIFE MANAGEMENT—AQUATIC

(See also the section "Pisces"; and Entries 1815, 2711, 3310)

1857. ANDERSSON, K. A. A study of the rate of growth of some fishes in the Baltic. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 67-72. Map. 1938.—That the rate of growth of animals is slow when they live in limited areas of the sea holds true

in general for the inner parts of the Baltic. But for the cod and herring, the rate of growth is faster in the Botten Sea (inner Baltic) than in the middle Baltic. This is explained by more favorable environmental conditions.—*F. N. Clark.*

1858. ANDERSSON, K. A. An investigation into the alterations in the growth-rate of the haddock. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 85-87. 1938.—O-group haddock in the Skagerrak in 1929 ranged in size from 16-19 cm., in 1938 from 20-23 cm. The 1929 O-group was about 37 times more abundant than the 1938 O-group. The difference in growth rate is attributed to differential competition between individuals.—*F. N. Clark.*

1859. BÜCKMANN, A. Über das Wachstum der Nutzfische im Gebiet der südlichen Nordsee. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 73-84. 1938.—The analysis of growth of net-caught fish in the southern North Sea presents many complications. This growth rate as indicated by various workers is reviewed for *Clupea harengus*, *C. sprattus*, *Gadus morrhua*, *Pleuronectes platessa*, *P. limanda*, and *Solea vulgaris*.—*F. N. Clark.*

1860. FAGE, L., et A. VEILLET. Sur quelques problèmes biologiques liés à l'étude de la croissance des poissons. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 45-48. 1938.—Studies on various species of fish indicate that the rate of growth and the relation of the growth of different parts of the body to the total length vary with age, sex and geographic location of the individuals. Thus, both internal and external factors are involved in the determination of growth rates.—*F. N. Clark.*

1861. HJORT, JOHAN. Studies of growth in the north-eastern area. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 1-8. 1938.—The herring of the northern North Sea furnish an example of a fish population whose variations in growth can be associated with environmental changes and are not influenced by the depredations of man; the cod comprises a fish population whose growth in more recent years has been altered by extensive fishing.—*F. N. Clark.*

1862. HÖGLUND, HANS. Über die horizontale und vertikale Verteilung der Eier und Larven des Sprotts (*Clupea sprattus* L.) im Skagerrak-Kattegatgebiet. *Svenska Hydrogr.-Biol. Komm. Skrift.* 2(3): 1-40. 7 maps, 2 fig. 1938.—The investigation is based on collections made during 1931-1934. The chief spawning area was found along the western coast of Sweden from near the Norwegian border to the vicinity of Anholt. It followed approx. the 50 and 100 m. depth curves. An independent spawning location was found in the Uddevallafjords (Isle of Orust). The fish spawn in the uppermost water layers. The vertical distribution of the developmental stages of the eggs was irregular at the different stations, indicating that, at least in this region, no change in the specific gravity of the eggs occurs. The sp. gr. varies greatly from station to station. An accumulation of larvae was observed during day time in the upper water layers.—*T. v. Brand.*

1863. JANSSEN, JOHN F. Jr. Second report of sardine tagging in California. *California Fish and Game* 24(4): 376-390. 4 fig. 1938.—From March, 1936 to June, 1938, 53,352 sardines were tagged on the coast of California. The tag used is a nickel-plated steel strip placed inside the body cavity of the fish. It is recovered by means of electro-magnets in meal lines of sardine reduction plants. Up to July, 1938, these tags have yielded 1334 recoveries. Most returns have been from fish caught soon after tagging in the same fishing region as tagged: however, 258 tags from southern California fish have been recovered in central California, and 30 in Oregon, Washington and British Columbia; 10 British Columbia tags and 1 Oregon tag have been taken in California and 8 central California tags were recovered in southern California. These recoveries indicate a summer northward movement and a southward movement during the late fall and winter. Recoveries show that the larger fish make longer migrations. An as yet unknown proportion of the tags are not recovered due to shedding of tags, death of fish as a result of tagging and inefficiencies in the methods of recovery.—*J. F. Janssen, Jr.*

1864. JENSEN, AAGE J. C. The growth of the plaice in the transition area. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 103-107. 1 fig. 1938.—The length of age-groups within the stock is dependent partly on growth and partly on the fishery. As the fastest growing fish of an age-group reach the size limit, they are caught off by an intense fishery and the size of the remainder thereby reduced. This amounts to 2 cm. for the II-group in the Belt Sea and 1 cm. in the northern Kattegat. Local differences in growth result from varying densities of the stock and available food supply. Temperature and salinity also play a rôle in growth rate. Intense fishing thins the stock and produces an increase in growth rate by eliminating competition for food.—F. N. Clark.

1865. JENSEN, AAGE J. C. Factors determining the apparent and the real growth. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 109-114. 1938.—Determination of growth by marking experiments leads to error if the recaptures tend to be selected from either the faster or slower growing fish. Growth rate determined from measurements of otoliths is in error when the growth rate of the otolith and the fish is not constant. Selectivity of gear may make inaccurate growth measurement from age analysis. Temp. and food influence growth rate. For the plaice the temp. limits of growth are about 10-15°C.—F. N. Clark.

1866. LEA, EINAR. A modification of the formula for calculation of the growth of herring. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 13-22. 2 fig. 1938.—Data given show that a straight line relationship exists between the growth of the fish and of the scale. From the basic equation for a straight line, an equation is developed which if based on adequate material should yield a growth formula for herring in which the effect of heteromorphic growth in fish length and scale size is largely compensated.—F. N. Clark.

1867. MOLANDER, ARVID R. Investigations into the growth-rates of the common dab and the flounder in the southern Baltic. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 89-101. 1938.—From 1919 to 1937 the growth rate of both the dab and flounder has increased and the older year-classes disappeared from the population. This change is ascribed to intensity of fishing, for as the catch per trawling hour decreases the growth rate increases. The proportion of ♂♂ has also diminished, possibly because the ♂♂ now reach their maximum size more quickly and hence have a shorter life span.—F. N. Clark.

1868. NEILL, R. M. The food and feeding of the brown trout (*Salmo trutta* L.) in relation to the organic environment. *Trans. Roy. Soc. Edinburgh* 59(2): 481-520. Map, 1 fig. 1938.—Quantitative data are given of stomach contents of trout obtained at regular intervals through the main feeding period of the year from a limited area of river (mean current velocity 4.07 ± 0.5 ft. per sec.). These are viewed alongside similar data of the fauna of the same area over the same period. The seasonal changes in both food and fauna are discussed. The correspondence of the 2 sets of data summarised by Spearman's rank coefficient of correlation is $R = +0.397$ with P.E. = 0.11. The accessibility to the fish of various potential food fauna present is discussed. The significance of accessibility as a limiting factor in the diet of wild fauna is brought out by the use of an arbitrarily assessed coefficient of accessibility, based on the bionomics of the groups concerned, which applied to the numerical data of the adjacent fauna previously given raises the correspondence with the trout's stomach contents to a high figure e.g., $R = +0.75$ or $+0.90$. The trout's diet covers the whole range of animals present in whatever type of habitat it occurs to an extent dependent on their degree of accessibility and the extent of their representation in the fauna. This accounts for the stomach contents without invoking discrimination by the fish. For trout specific food lists are invalid, and food (except as regards quantity) is but a limiting factor in distribution.—R. M. Neill.

1869. OTTESTAD, PER. On the relation between the growth of the fish and the growth of the scales. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 23-31. 1938.—From the vast literature on the

subject, representative papers which deal with varied methods are discussed. This discussion indicates that the study of the nature of the relationship between the size of the scale and the corresponding average fish length cannot furnish proof or disproof of the constant ratio of fish length to scale length of individual fish, nor can it reveal the relationship between the growth of the fish and its scales. There are, however, so many indirect proofs that the fish and the scales grow proportionally, that this may be accepted as a fact. This does not mean that the relationship is a straight line in mathematical terms but that the ratio is approximately constant throughout life.—F. N. Clark.

1870. POULSEN, ERIK M. On the growth of the cod within the transition area. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 49-51. 1938.—Spawning begins in the northern part of the area about Feb. and shifts gradually to about June in the region of the Baltic. The growth rate is more rapid to the north and lessens to the south. This is caused in part by earlier spawning and later age at first maturity in the more northern populations. The slower growth rate to the south must, however, involve other factors which are not understood at present.—F. N. Clark.

1871. POULSEN, ERIK M. On the growth of the Baltic plaice. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 53-56. 1938.—Intensive fishing has thinned out the Baltic stock of plaice and resulted in an increased growth rate. Thus external and not internal factors appear to be the chief determinants of growth rate within the range of growth for the species.—F. N. Clark.

1872. ROLLEFSEN, GUNNAR. Changes in mean age and growth-rate of the year-classes in the Arcto-Norwegian stock of cod. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 37-44. 1938.—The proportion of older year-classes in the adult population of cod in the Lofot fishery has decreased remarkably. This may have been caused by increased mortality among the adult fish, by accelerated sexual maturation in the immature stock, by increased mortality among the immature fish. Norwegian fishing has not increased in intensity but the trawl fisheries of England and Germany have taken an increased toll from the adult cod. The English and Russians have similarly increased the strain on the immature fish. There is also evidence of an acceleration in maturation in the immature stock.—F. N. Clark.

1873. ROUNSEFELL, GEORGE A., and GEORGE B. KELEZ. The salmon and salmon fisheries of Swiftsure Bank, Puget Sound, and the Fraser River. *Bull. U. S. Bur. Fish.* 49(27): 693-823. 4 pl., 3 fig. 1938.—The sockeye salmon, *Oncorhynchus nerka*, spawns chiefly in the tributaries of lakes in the Fraser River system. The young live about 1½ years in these lakes before descending to the sea. They mature chiefly at 4 years of age and weigh about 6 pounds. An analysis of seasonal occurrence from gill-net catches indicates that the heavy, early-season run of superior quality sockeyes has suffered the greatest decrease in abundance. Indices of abundance from gill-net and trap catches both show a tremendous decline in all cycles. The coho salmon, *O. kisutch*, is the most widely distributed species of salmon found in the region. 98% mature at 3 years of age, and weigh about 7-8 pounds, and the migration to the spawning beds occurs during the fall months, at which period the greater part of the catch is made. Indices of abundance from both trap and purse seine catches show a high level of abundance in early years and a present level that is lower than at any previous time in the history of the fishery. The king salmon, *O. tshawytscha*, spawn chiefly in the upper portions of the larger streams. The young usually dwell some time in fresh water before descending to the sea. They mature chiefly at 3 and 4 years of age and weigh about 22 pounds. They are caught from early spring to fall, the bulk of the catches being made during early summer. Indices of abundance from trap catches do not show any definite trends in the northern areas, but do indicate a decrease in the runs of recent years in the southern part of Puget Sound. The pink salmon, *O. gorbuscha*, spawn in the lower reaches of the streams. Upon hatching the young descend im-

mediately to the sea. The adults invariably mature at 2 years of age and weigh about 4 lbs., and in the greater part of this region they appear in abundance during the odd-numbered years, whereas only a few thousand are taken in the even-numbered years. Indices of abundance from purse seines and traps indicate that, following the obstruction at Hell's Gate in 1913, which prevented them from reaching their spawning grounds in the upper Fraser River, the pinks declined to about $\frac{1}{4}$ of their former abundance. The chum salmon, *O. keta*, spawn in the lower portions of the streams and the young go directly to the sea. An index of abundance from Admiralty Inlet traps shows abundance in recent years to be less than half that of the period previous to the war. The average size of delivery by purse seines also indicates a higher level of abundance previous to 1915.—*Auth. summ.*

1874. RUUD, J. T. On the Norwegian research work concerning *Pandalus borealis*. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 107(3): 67-68. 1938.—The report is a summary and discussion of data published as Hvalradets Skrifter Nr. 17. The destruction of young prawn and the limits of trawl net mesh size are reviewed.—*J. L. Wilding.*

1875. STORROW, B., and DOROTHY COWAN. Herring investigations. *Rept. Dove Marine Lab. Ser. III.* 5. 10-19. 1938.—Herring investigations of previous years have been continued. The age and growth rate of 1444 herring taken in commercial catches at Yarmouth and Buncrana were detd. Young fish with 2 winter rings were not so abundant as in 1935, forming 15% of the sample, 61% were 3 year olds and 18% 4 year olds and the remainder 5 or over. Fish with 3 and 6 winter rings formed the bulk of the 1936 sample and averaged 24.1 and 26.6 cm. res. The winter fishery of the north of Scotland was a failure and no fish were obtained. The growth rates of early maturing fish from the north-west coast are compared with those of an estuarine school. The estuarine fish made a more rapid growth during their 3d year. The majority of the Buncrana sample were 6 and 9 years old, and 25% of the fish were less than 4 years old.—*J. L. Wilding.*

1876. SUND, OSCAR. On diversity of growth in fish. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 33-36. 1938.—The standard deviations of the yearly increments in length, measured from scales, furnish a clue to the history of fish in a sample. A large value for the standard deviation indicates a diversified history for the sample and a small value suggests that the population from which the sample came had a long common history. Cod measurements indicate that the populations have been formed by a gradual accumulation; haddock, an early diversified history with later accumulation; saithe, a common history throughout the life of the population.—*F. N. Clark.*

WILDLIFE MANAGEMENT—TERRESTRIAL

1877. CHAPPELLIER, A. Le piège—chronomètre. *Ann. Epiphyties et Phytogénétique* 4(2): 333-336. 4 fig. 1938.—An apparatus is described for registering the times at which small rodents are snared.—*W. V. L.*

1878. GLADING, BEN. Studies on the nesting cycle of the California valley quail in 1937. *California Fish and Game* 24(4): 318-340. 11 fig. 1938.—Studies on the California valley quail (*Lophortyx californica vallicola*) are in progress at the San Joaquin Exptl. Range in the Sierra Nevada foothills of Madera County, California. 96 nests were found in 1937 from Apr. 22 to July 26, the largest number in May. 11 cover types were utilized for nesting; dry grass or weeds with no other protection and dry grass or weeds growing through fallen dead brush and rock outcrops being used most commonly. Incubated nests averaged 10.97 eggs per clutch and successful nests averaged 10.18 young per brood. Only 17 of the 96 nests were successful. 18 were abandoned either before or after eggs had been deposited. Ground squirrels (*Citellus b. beecheyi*) were inferred to have taken large numbers of eggs; 30 nests were charged to ground squirrel depredations. An increase in quail of 154% over a period of 2 years followed ground squirrel control on a 300-acre plot; no such change occurred during the same period on an adjacent non-controlled area.

Coyotes, bobcats, feral house cats, skunks, gray foxes and California jays each destroyed small numbers of nests. A few were destroyed accidentally by livestock. Manipulation of nesting environment may be an important game management tool for this species.—*B. Glading.*

1879. GREEN, WILLIAM EDWARD. The food and cover relationship in the winter survival of the Ring-necked Pheasant, *Phasianus colchicus torquatus* Gmelin, in northern Iowa. *Iowa State Coll. Jour. Sci.* 12(3): 285-314. 8 pl. 1938.—Studies carried on during the most severe winter ever recorded for Iowa (1935-'36) showed a high mortality of the Ring-necked Pheasant. There seemed to be an abundance of both food and cover, but the two were not present in the proper relationship. Mortality was largely due to climatic factors. Predation and poaching losses were negligible, as were losses from pneumonia. There was a total loss of 48.2% of the population during the winter. Freezing and choking, responsible for a loss of 27.2% of the population, were the most lethal factors. Mortality increased in a direct proportion to the distance of food from cover. Losses were at a minimum in areas where there was good cover adjacent to an available food supply; in areas where the flocks were compelled to range from cover in order to feed, the losses increased as the distance necessary to range in feeding increased.—*W. E. Green.*

1880. LAY, DANIEL W. How valuable are woodland clearings to birdlife? *Wilson Bull.* 50(4): 254-256. 1938.—30-min. time-unit bird counts in Walker County, Texas, pine-oak-hickory woodland revealed that the margins of clearings contain 41% more species and 95% more individual birds than the corresponding woodland interiors.—*D. W. Lay.*

1882. OLSON, SIGURD F. A study in predatory relationship with particular reference to the wolf. *Sci. Month.* 45(4): 323-336. 3 map, 6 fig. 1938.—Predators have been eliminated without regard for the influence they might have upon the balance of life in the communities of which they are a part. Game refuges have often been administered as herbivore sanctuaries so that primitive conditions under which hoofed game retains its natural alertness are now mostly lacking. Probably more wolves remain in the Superior National Forest in northeastern Minnesota than in any other part of the U. S. Despite popular belief that wolves live upon deer, the food in summer includes grouse, mice, voles, marmots, fishes, snakes, insects, and some vegetation. In fact almost anything that crawls, swims, or flies may be included in the diet. In winter when most of the small mammals are in hibernation and other items of the summer food unavailable, the wolves are forced to feed almost entirely upon deer and snowshoe hares. When food is scarce, 3-4 meals a month will keep a wolf from starving.—Conditions of the Superior National Forest environment, hunting habits of the wolves, and organization and range of the packs are described. The author contends against the belief that wolves kill wantonly. He interprets apparently excess killing when opportunity affords as an instinctive first step in a process of building up a reserve food supply. Carcasses not consumed at first under natural conditions would be revisited and eaten later. The author believes that the poisoning of carcasses and setting traps around them has instilled fear to such an extent that wolves are reluctant to approach them. Thus control campaigns prevent the animals from eating all of their kills and compel them to kill more than they would if unmolested. There are about 250 wolves on the area discussed and they kill about 1,500 deer annually. The deer population is in the neighborhood of 20,000 animals, a herd that can stand yearly loss of about 4,000 without diminution of the breeding stock. The presence of wolves in a wilderness area instead of being a hazard is an asset to big game. The majority of the kills are old, diseased, or crippled animals, the elimination of which is a benefit to the stock and the depredations of the wolves conduce to a desirable state of alertness on the part of the deer. Experience on the Superior Natl. Forest demonstrates that sanctuary can be given to both carnivores and herbivores without danger of decimation of the big game.—*Courtesy Wildlife Rev.*

BIOLOGICAL ABSTRACTS

Editor-in-Chief, JOHN E. FLYNN; Assistant Editor, JEAN MACCREIGHT

VOLUME 13

MARCH, 1939

Entries 3406-5254

NUMBER 3

GENERAL BIOLOGY

Editors: A. H. GRAVES, *Plant*; C. A. KOFOID, *Animal*

(See also in this issue Entries 3437, 3438, 3443, 4533, 4793, 5055, 5129)

PHILOSOPHY OF BIOLOGY

3406. BEUTNER, R. Life's beginning on the earth. x+222p. 80 fig. Williams and Wilkins Co.: Baltimore, Md., 1938. Pr. \$3.—Explaining the origin of life is undoubtedly the most important problem in science; a problem which cannot be neglected even though its solution presents overwhelming difficulties. Life's most apparent general feature is its endlessly varied morphology; hence, the key to its mysteries is sought in an exhaustive study of living forms. This study leads to the impression that nothing comparable to vital forms can arise in the non-living world. But such a belief is hardly correct; we have recently become acquainted with a great variety of non-living structures which bear a certain similarity to living ones. This book describes a number of such "life-like," but lifeless structures, e.g.: O. Bütschli's crystalline starch globules which simulate nucleated cells; St. Leduc's osmotic plants which imitate plant life in many details; and Crile's "autosynthetic cells" (as announced at Cleveland in 1930) which are, in reality, respiring and moving oil drops. The book describes the methods by which these and other artefacts can be made, and presents numerous illustrations of them. It also discusses the mechanism of the physical and chemical forces which lead to their formation, and arrives in every instance at the conclusion that the same physical and chemical forces are acting in them as in real, living organisms. The similarity between life-like artefacts and certain simple living organisms is, therefore, not accidental but caused by an identical working mechanism. However, the book clearly points out that we can never expect to arrive at the synthesis of real, living organisms through studies of this kind, even if we should succeed in markedly perfecting the technique. Setting aside all other shortcomings, the artificial structures fail completely in regard to one feature of life, namely, self-reproduction. The book attempts to solve the problem of self-reproduction on the basis of the work of W. M. Stanley who first obtained the virus of Tobacco Mosaic in crystalline form. It is idle to discuss the question whether this crystalline virus is living or not. Some may insist that a living thing must have a particular structure such as a nucleus or a cell membrane or any of the morphological ear-marks well known in biology; all of which, of course, are absent in a virus on account of its size which approaches that of molecular aggregates. But it must be conceded that self-reproduction means life; the shape is not necessarily an indispensable factor. Through these considerations, the author is led to the assumption that some monomolecular form of life, remotely similar to the virus, may be the simplest one possible, and probably also the earliest one to appear on the earth. Chemically speaking, a monomolecular living thing is a self-regenerating enzyme; it sets up in its environment chem. reactions the end-product of which is the enzyme itself. Thus, reproduction seems to be based essentially on enzymatic processes. Assuming that self-reproducing enzymes were the first form of life to appear on the earth, the book develops the hypothesis that they may have formed on the early earth through the action of electrical discharges. Laboratory expts. show that electrical discharges when passing through carbon-containing gases give rise to a great

variety of substances. But, it is also necessary to assume that these preparatory enzymatic processes lasted through millions of years.—*Author.*

3407. MULLER, H. J. *Hors de la nuit. Vues d'un biologiste sur l'avenir.* Transl. from English by JEAN ROSTAND. 184p. Gallimard: Paris, 1938. Pr. 18 fr.—The entire "machinery" to build a man is contained in a single fertilized egg, of which 2 000 000, enough to form an entire human generation, might be packed in a one-gallon pitcher; the nuclei, the real hereditary material, would occupy the volume of a single aspirin tablet. "Progress" along competitive lines does not determine happiness but only survival. Man's entire evolutionary period is but a brief probation at the end of a vast chain of organic evolution. He has attained dominance through a combination of intelligence and social behavior. Thus our crania are packed with tradition while our native intelligence is still of Stone Age calibre, not many times greater than that of some animals. Advancing knowledge has introduced conflicts and instability into man's view of life, resulting on the one hand in pessimism and on the other in hope of better times through social cooperation. Anarchy has come about in our social system and the human germ plasm is rapidly degenerating through disruptive mutations not adequately counterbalanced by natural selection. A thoroughgoing eugenics is essential, but such is not possible save after radical economic readjustment and the establishment of society on rational cooperative principles. The outer world is being controlled more and more by advance of physical science and most routine work will eventually become standardized; but petty ills and physical maladjustments have not been adequately subjected to intelligent study and control. Eugenics will seek not a single standard of perfection but will recognize the need of many diverse types. A more truly cooperative society would hold opportunities more nearly constant and thus a man's genetic worth might be better appraised. Whatever average differences may exist between social classes and races are overshadowed by the great genetic heterogeneity in any class or race. The author holds that our present system tends to favor the dominance of the predatory, and hence a good case may be made out for the genetic inferiority of the upper classes as judged by ethical standards; and that with the downfall of sex taboos there will come about a more widespread utilization of advancing biological knowledge: transplantation of ovaries would greatly extend the reproductive potencies of women possessing characters particularly excellent, and by artificial insemination it would be possible for some transcendently estimable man to transmit his qualities to a vast number of children. The physical means for separation of personal love from the needs of reproduction are now known for the first time in history. Culturing sex cells years after the death of the donor is a possibility. Life is divided into 3 phases;—a long preparatory phase in which as the creature of environment, it eventually attained human form; our present brief transitional phase with man reaching out into his immediate environment and shaping it to his needs and wishes; and a long future phase in which through rational eugenics man will shape himself into a sublime being.—*P. W. Whiting.*

3408. RAYLEIGH, I. Vision in nature and vision aided by science. II. Science and warfare. *Rept. Brit. Assoc. Adv. Sci.* 108: 1-20. 1938.—I. A brief account of the physics of vision and the structure of the eye leads to a discussion of the artificial auxiliaries that science employs to extend the range of normal vision—telescope, microscope, electron microscope, x-ray microscopy devices, spectroscopy, photographic and photoelectric light-receptor surfaces—mentioning the uses, advantages and limitations of each.—II. Though it is admitted that many inventions and discoveries, in themselves beneficent, have been applied to destructive purposes, and have furthered aggression, the author holds that neither science nor scientists can be blamed for the misapplication of their discoveries. "... The application of fundamental discoveries in science to purposes of war is altogether too remote for it to be possible to control such discoveries at the source."

MICROSCOPY, INSTRUMENTS, TECHNIQUE

3409. GODLEWSKI, HENRI. Quelques observations concernant la microincinération effectuée à l'aide d'un dispositif nouveau permettant le contrôle direct de ce processus (1). *Bull. Histol. Appl. Physiol. et Path.* 15(9): 245-264. 7 fig. 1938.—A chamber fitting a microscope stage is devised to incinerate paraffin sections of tissue while under continuous observation. The objective is immersed in a sac with a mica window. Cold solns. bathe the objective in a controlled circulation. Temp. of the incinerating chamber is measured by thermocouple and controlled by a zinc and bicarbonate liquid rheostat. At high temps. the filament gives illumination enough for darkfield work. Magnification to 244× is possible. The phase of desiccation is separable from carbonization and the latter differs for various cellular elements.—J. G. Sinclair.

3410. LENOIR, MAURICE. Méthode de fixation cellulaire, de coloration nucléaire, de dissociation des tissus végétaux et d'étude extemporanée de certains pollens. *Bull. Mens. Soc. Sci. Nancy* 3(4/5): 116-120. 1938.—A soln. of carmine, formaldehyde, acetic acid, and K alum is used.—W. C. Tobie.

3411. MacLAUGHLIN, E. H. A practical and inexpensive vivarium for the biology laboratory. *Amer. Jour. Pharm.* 109(10): 512-515. 1 fig. 1937.

TAXONOMY AND NOMENCLATURE

3412. GINSBURG, ISAAC. Arithmetical definition of the species, subspecies and race concept, with a proposal for a modified nomenclature. Containing a simple method for the comparison of related populations. *Zoologica [New York]* 23(3): 253-286. 4 fig. 1938.—Intergradation between species and lower taxonomic categories is so nearly universal that it needs to be measured in taxonomic work. It is proposed to do this by ascertaining the amount of overlapping of the 2 curves representing the variation of that character of the 2 groups being compared in which they differ the most. If the ratio of the overlapping area to the area of the 2 frequency polygons combined is between 30% and 40%, the groups are to be regarded as different races. A ratio of 15% to 25% would indicate that they are different subspecies; not over 10%, different spp. These criteria are applied to a number of groups of fishes, and are held to yield conclusions more nearly in accord with the views of taxonomists than does the more usual statistical criterion, namely, the ratio of the difference between two means to its own probable error.—Methods of sampling that will give truly representative groups for comparison are urged.—It is proposed that all taxonomic designations be binomial (not trinomial nor quadrinomial), and that the name of minor rank be given a subscript numeral (1, 2, 3) to indicate whether it refers to a species, subspecies, or race.—A. F. Shull.

EXPLORATIONS, EXPEDITIONS, ETC.

3413. BOONE, LEE. Scientific results of the world cruises of the yachts "Ara," 1928-1929, and "Alva," 1931-1932, "Alva" Mediterranean cruise, 1933, and "Alva" South American cruise, 1935, William K. Vanderbilt, Commanding.

Bull. Vanderbilt Marine Mus. 7: 1-372. 152 pl., 22 fig. 1938.—Two marine algae—*Caulerpa webbiana* var. *tomentella** and *Cheilosporum sagittatum**—are descr.—In the Coelenterata, n. spp. are descr. in *Corydendrium* (1, Hawaiian Is.), *Veretillum* (1, Philippines), *Dendronephthya* (1, S. China Sea), and *Gemmaria* (1, Marquesas); in all, 24 spp. are discussed.—In the Annelida, 11 spp. were taken and are discussed, none new.—In the Echinodermata new spp. are descr. in *Pentacta* (1, Indo-China and S. China Sea); in all, 32 spp. are treated.—In the Crustacea, n. spp. are descr. in *Pagurus* (1, Hawaiian Is.); 35 spp. are discussed. In the Mollusca 38 spp. are discussed, none new.

CONSERVATION AND NATURE STUDY

3414. DARLING, F. FRASER. Wild country. A highland naturalist's notes and pictures. vii+104p. Illus. University Press: Cambridge, 1938. Pr. \$2.75.—This is a book of photographs of seals, sandpipers, birds in flight, deer, waves, rocks, mountains and flowers. The animals were stalked by the cameraman and so caught unawares in their natural habitats. The notes which accompany the pictures touch on many aspects of the country side of Scotland,—the distinctive flora, the lost forests. They also afford interesting lights on animal behavior.

TEXTS AND EDUCATION

3415. LIPPMAN, T. Les collections systématiques et phytogéographiques du Jardin Botanique de l'Université Estonienne à Tartu. [In Estonian with Fr. summ.] *Acta Inst. et Horti Bot. Univ. Tartu* 5(3/4): 1-375. 191 fig. 1937.—The chief part of the paper is a textbook of systematic botany (Phanerogams), intended for the use of students of botany at the Univ. of Tartu, and therefore giving principal consideration to the plants of Estonia and the living plants in the Tartu Bot. Garden. This part contains 3 schemes illustrating the relationship of the families of Monocotyledones and Dicotyledones (after Engler, Hutchinson etc.). For the more important families of flowering plants the floral formulae are given. All the illustrations are original. The phytogeographical part contains brief descriptions of the vegetation of Estonia, the Subarctic Region, the Alpine Region, the Caucasus, Siberia, E. Asia and N. America. A brief historical review of the development of the garden since its foundation in 1803 is added.—T. Lippman.

MISCELLANEOUS

3416. FURNAS, C. C. Le siècle a venir. [The next hundred years.] Transl. from the Eng. by A. M. PETIT-JEAN, 286p. Gallimard: Paris, 1938. Pr. 40 fr.—This translation is an addition to the French series *L'Avenir de la Science* edited by Jean Rostand.—C. A. Kosoid.

3417. GRAM, K., HJ. JENSEN, og A. MENTZ. Nytteplanter. [Useful plants.] 501p. 300 fig. Gyldendalske Boghandel, Nordisk Forlag: Copenhagen, 1937. Pr. Kr. 9.75, in binding 15.75.—A popular account of the importance of plants in human life. Food plants, stimulative plants, medical and poisonous plants, technically useful plants, and soil-improving plants are treated.—H. E. Petersen.

3418. TAYLOR, GRIFFITH. Correlations and culture. A study in technique. *Rept. Brit. Assoc. Adv. Sci.* 108: 103-138. 18 fig. 1938.—After a discussion of the rôle of geography, as a principle of integration and a link between science and the humanities, the author reviews his theories, and those of Matthew and others, on the origin and dispersal of the Mammalia and of the various races of man. The address then passes to a discussion of the diffusion of cultures, and the determination of cultural development by geographic factors.

3419. ANONYMOUS. From a physiologist in America. *Lancet* 236(6019): 48; (6020): 112; (6021): 173. 1939.—To see ourselves as others see us we should read these charming, humorous letters from a visiting English physiologist. Workers at Woods Hole, Yale and in New York will especially appreciate the 3 letters which have been published and hope for more.—J. B. Paton.

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 4533, 4799)

HISTORY

3420. JEPSON, WILLIS LINN. *Viae felicitatis: the beginning years of the California Botanical Society. Madroño* 4(8): 276-286. 1938.—Speech given at the annual dinner of the California Botanical Society at Berkeley, California, April 23, 1938 celebrating the 25th anniversary of the Society. The principal objectives of the Society, the furtherance of the botanical research in western N. America by public meetings, field trips and the publication of a journal (*Madroño*) have, with but few reverses, been carried out successfully since the founding of the Society in 1913.—A. Carter.

3421. DANIELS, JOSEPHUS. The dedication of Mexico's Leland Ossian Howard Entomological Laboratory. *Jour. Econ. Ent.* 31(6): 773-775. 1938.

BIOGRAPHY

3422. BRACELIN, H. P. Ynes Mexia. *Madroño* 4(8): 273-275. Portrait. 1938.—A short biographical sketch of Ynes Mexia, botanical collector, born in Washington, D. C., May 24, 1870, died at Berkeley, California, July 12, 1938. Summarizes her botanical expeditions to Alaska, Mexico and S. America and lists publications relating to them.—E. Crum.

3423. CHRISTY, BAYARD. The sage of Rockport. *Cardinal* 5(1): 1-14. 1 pl. 1939.—An appreciation of J. P. Kirtland.—D. S. Lehrman.

3424. COOK, E. F. Charles Herbert LaWall. *Industr. and Engin. Chem. News* ed. 16(1): 21. Portrait. 1938.—Died Dec. 7, 1937, aged 66.

3425. DALLENBACH, K. M. Henry Herbert Donaldson: 1857-1938. *Amer. Jour. Psychol.* 51: 434-435. 1938.

3426. EDITORIAL. The achievements of the late Dr.

Hideo Kaneko. *Bull. Sericult. and Silk Indust. [Japan] (Sanshi-Gaku Zasshi)* 10(4): 241-261. 1938.—Dr. Hideo Kaneko was a member of the Chemical Institute, Faculty of Science, Tokyo Imperial University, Tokyo, Japan. His work on sericin is especially outstanding.—C. S. Gibbs.

3427. GOULD COMMEMORATIVE ISSUE. *Emu* 38(2): 89-244. 2 maps, 10 pl. (1 col.) 1938.—Twenty-one papers by various authors on the life and work of John Gould, with special reference to his work on Australian birds.—P. A. Gilbert.

3428. GRINNELL, JOSEPH. In memoriam: Richard C. McGregor ornithologist of the Philippines [1871-1936]. *Auk* 55(2): 163-175. 1 pl. 1938.

3429. HELANDER, A. BENJ. Anton Gabriel Blomqvist ja hänen aikalaisensa. [With Ger. summ.] *Acta Forest. Fennica* 43(2): 1-356. 21 pl. (1936) 1938.—An account of the life and work of this pioneer Finnish forester and educator (1836-1904).

3430. KEMPTON, J. H. Guy N. Collins [1872-1938]. *Science* 88(2290): 467-468. 1938.—Principal Botanist of the Div. of Cereal Crops and Diseases, Bureau of Plant Industry, U. S. Dept. of Agric.

3431. MASON, HERBERT L. Harry Stanley Yates. *Madroño* 4(6): 187-188. 1938.—A brief biography of Dr. Yates, mycologist and botanical collector, who was born at Marshall, Minnesota, October 2, 1888, spent a considerable portion of his life in the Philippine Islands and in East Coast Sumatra and died at Berkeley, California, January 17, 1938. A chronological list of published writings (11 titles) is included.—H. L. Mason.

3432. SCARTH, GEORGE W. Francis Ernest Lloyd. *Plant Physiol.* 13(4): 878-880. 1938.—Brief appreciative note on the occasion of Lloyd's 70th birthday.

BIBLIOGRAPHY

MRS. EILEEN R. CUNNINGHAM, *Editor*

3433. BEAN, DONALD. The riddle in research. *Proc. Amer. Philos. Soc.* 80(1): 37-47. 1939.—An address, dealing mainly with the placement of financial responsibility for publishing works of scholarship, and the available methods of financing such publication.

3434. THE BULLETIN OF ANIMAL BEHAVIOUR. Vol. 1, no. 1, October, 1938. (28 pages). In charge of subscriptions—J. Fisher Esq., Hon. Secretary, Inst. for the study of Animal Behavior, Zoological Society, Regent's Park, London, N. W. 8. Four issues per yr. Publ. by the Institute for the study of Animal Behaviour.—The Institute for the Study of Animal Behaviour was founded in 1936, "to promote the study of animal behaviour, to encourage the undertaking of research into animal behaviour and the publication of the results of research, and to carry on such further activities as may from time to time be held to forward these objects." The object of the Bulletin is to provide a review of recent studies of animal behaviour. No attempt is made to make the treatment of the separate articles uniform, but overlapping has been avoided, and where convenient the language has been simplified with the aim of making the Bulletin of interest to lay as well as to scientific readers. Each article provides references to the recent literature. The Institute is itself bearing the cost of the first issue; a small charge will be made for future numbers. The first issue contains the following articles:—Review of recent ecological literature, by H. G. VEVERS; Field observations on birds in 1937, by JAMES FISHER and DAVID LACK; Perception and sensibility, by D. HERTZ; Cognitive aspects of behaviour. Learning and intelligence, by G. C. GRINDLEY; Monkeys and apes, by J. W. B. DOUGLAS.

3435. LLOYDIA. A Quarterly Journal of Biological Science. Vol. 1, nos. 1-4, December, 1938 (published January 7, 1939). 254p. Editor, THEODOR JUST, Associate Editor, JOHN H. HOSKINS. Publ. quarterly by the

Lloyd Library of Natural History, Cincinnati, Ohio. \$3. per yr.—This issue contains the following papers: The morphology of *Artemisia tridentata* Nutt., by R. A. DIETTER; Revision of *Horkelia* and *Ivesia*, by DAVID D. KECK; The Genus *Eucrypta* Nutt., by LINCOLN CONSTANCE; Tropical Dacrymycetaceae, by TRAVIS W. BRASFIELD; The Cladoniae of eastern Kentucky, by MARGARET FULFORD; The Nearctic species of *Netelia* (*Paniscus* of Authors) and a revision of the genera of Neteliini (Hymenoptera, Ichneumonidae), by HENRY KEITH TOWNES, Jr.; and The genus *Phlepsius*—a study of the North American species with special reference to the characters of the male genitalia, by DWIGHT M. DeLONG.

3436. MALONE, DUMAS. The scholar and the public. *Proc. Amer. Philos. Soc.* 80(1): 25-36. 1939.—An address consisting mainly of a discussion of the extent to which the results of research should be published in book form, or put on record in less expensive, less permanent ways.

3437. SCHRAMM, J. R. Cost analysis of scholarly periodical printing. Preliminary report of the committee on abstracting and documentation of scientific literature of the National Research Council. *Proc. Amer. Philos. Soc.* 80(1): 1-24. 1939.—The major operations in printing a journal are descr. and their cost behavior analyzed. The cost of composition and proof-reading is determined by the number of words in the text, and is scarcely at all affected by the number of pages over which the text is finally spread; of the operations subsequent to composition and proof-reading, some—make-up, imposing, lock-up, make-ready, press work, folding, binding (if by sewing) and postage—are detd. essentially by the number of pages, while others—binding (if by wire stitching), cost of cover paper and covering, addressing, wrapping and mailing—are governed neither by number of words nor by number of

pages. Excepting for possible saving resulting from greater editorial condensation—with which this study is not concerned—the only important opportunities for economy in printing costs lie in the second group (i.e., in economizing by reducing the number of pages over which the text is spread). Comparison of formats and of printers' costs, should be on the basis of cost per word per 1000 copies. Costs of publication of a number of journals, by different publishers, show great differences, when compared on this

basis; these data obtained for 12 journals showed that, in general, the fewer the words per page, the more expensive (on a per word basis) is the printing. In the group of journals studied, substantial economies would have been possible by increasing the number of words per page. Means of increasing the number of words per page are pointed out; use of 2-column format is, within certain limits, one of the most important of these. Editor's specifications for attaining printers' bids are briefly discussed.—J. E. F.

EVOLUTION

(See also in this issue Entries 3406, 3412, 3450, 3523, 4774, 5163)

3438. CUÉNOT, L. Présentation d'un arbre généalogique du règne animal. *Bull. Mens. Soc. Sci. Nancy* 3(4/5): 110-115. 1 pl. 1938.—A phylogenetic tree is presented and described, with emphasis upon the emergence of higher forms from a water to a land habitat.—W. C. Tobie.

3439. LEBEDKIN, S. Biiagenetychny zakon i teoriya rekapitulatsyi. (The biogenetic law and the theory of recapitulation.) 12 fig. 387p. [In Russ., with Eng. summ. p.333-373.] White-Russian Acad. Sci. Belaruskai Akademii Navuk: Mensk, 1936(rec'd 8-5-38).—Following a historical critique, the author considers neither "Biogenetic Law" nor "Theory of Recapitulation" as warranted, but provisionally accepts a "recapitulation doctrine" as basis for attempted verification, and definitely accepts known "phenomena" or "cases" of recapitulation. He discusses previous attempts to classify recapitulations, and suggests other criteria for recognizing and classifying them, with examples. Possible mechanisms are suggested, on the basis of mechanics of development. Russian works are especially represented in the selected bibliography of 370 titles on evolution, embryology and their interrelations.—H. E. Wood, II.

3440. McDOUGALL, W. Fourth report on a Lamarckian experiment. *Brit. Jour. Psychol.* 28: 321-345; 365-395. 1938.—The author describes further expts. on the inheritance in rats of the ability to learn to choose the dark and avoid the brightly lighted and electrified route out of a water tank, including the effect of selecting the best and the worst performers from each generation and breeding from them. McDougall confirms his previous conclusions as to the

existence of Lamarckian inheritance, and replies to the criticisms of Crew, T. H. Morgan, H. S. Jennings, and others.—M. D. Vernon (courtesy of *Psych. Abst.*).

3441. McDOUGALL, W. Une expérience lamarckienne à résultats positifs. *Jour. Psychol. Norm. Path.* 34: 413-425. 1937.—This is the report of an exp. using rats in a water maze, carried on for 38 generations, which shows inheritance of acquired characteristics. In answer to the criticism that his results might be due to selection, the author ran 2 other groups of rats, the ancestors of one group chosen because they were least successful on the maze and those of the other group being the best rats. The results here also upheld his Lamarckian contentions. The criticism that the improvement might be due to a social transmission is discussed and likewise disposed of.—R. E. Perl (courtesy of *Psych. Abst.*).

3442. STURTEVANT, A. H. Essays on evolution. II. On the effects of selection on social insects. *Quart. Rev. Biol.* 13(1): 74-76. 1938.—If natural selection be considered as operating on individuals only, then it is impossible to account for the sterile castes in social societies like those of the ants. Hence selection is considered to work also on colonies of individuals. In this paper it is suggested that selection must work also on the population within an area or colony. For this belief there is some factual support.—H. G. Swann.

3443. SWINNERTON, H. H. Development and evolution. *Rept. Brit. Assoc. Adv. Sci.* 108: 57-84. 4 fig. 1938.—A critical discussion of Recapitulation.

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. McCLUNG, *Animal*

(See also in this issue Entries 3410, 3457, 3578, 3949, 4187, 4356, 4397, 4741, 4774, 5105, 5145)

GENERAL

3444. GULICK, ADDISON. What are the genes? I. The genetic and evolutionary picture. II. The physico-chemical picture; conclusions. *Quart. Rev. Biol.* 13(1): 1-18; (2): 140-168. 1938.—These 2 papers "endeavor to place the problem of genes briefly under combined illumination from the diverse slants of cytology, genetics, biochemistry, and portions of the evolutionary field of study." At the end of the 2d paper, a summary of the exposition is presented. The author summarizes data leading to the following, often tentative, conclusions: The matrix on which or in which the genes lie is a combination of nucleic acid with special proteins. The structure and material of the genes themselves is, however, largely unknown. They are probably large molecules, but constitute but a small fraction of the mass of the chromosomes on which they are located—probably less than one-twentieth. Their size is about that of the ovalbumin molecule; it is compared with that of enzymes and viruses. They may be pictured as having an internal lamellar structure like other proteins (useful pictures are given). The total number of genes is moderately large: at least 2,000 for the haploid count of *Drosophila* and 3-6 times more for man. Each gene has 2 types of action: an autocatalytic (the term "autosynthetic" is suggested) action and an enzyme-like action which may at times exert hormone-like actions. "As part of the evolutionary process, a gene must be credited with a liability for undergoing chemical alteration to produce a

new gene substance with a slightly different molecular composition, capable of autocatalysing itself, including the new item in its constitution." "Quantitative changes in the gene equipment may occur by 'mutation.'" "The two processes of gene reduplication and single-gene mutation, taken together, provide a possible mechanism by which a complex genetic machinery may be evolved out of simpler antecedents." The author suggests that genes may be considered as essentially living units because they are subject to the biological type of evolutionary process.—H. G. Swann.

3445. GUSTAFSSON, AKE. The cytological differentiation of male and female organs in parthenogenetic species. *Biol. Zentralbl.* 58(11/12): 608-616. 1938.—Additional details on micro- and macro-sporogenesis in parthenogenetic plants (*Taraxacum*, *Antennaria*, *Hieracium*, *Erigeron*) are discussed in regard to the author's previous proposal to use the mode of origin of the unreduced chromosomal number as the basis of classification for parthenogenetic types in both plants and animals.—A. H. Hersk.

3446. GUYER, MICHAEL F., and PEARL E. CLAUS. Relative viscosities of tumor cells as determined by the ultracentrifuge. *Anat. Rec.* 73(1): 17-26. 2 pl. 1939.—Judging from the lack of displacement of cellular contents in tumor cells subjected to centrifugalization at extremely high speed, the protoplasm of cancer cells, notably that of carcinomas and adenofibromas, has a decidedly greater viscosity than that of normal tissue cells. This viscosity may at times be an important factor in the accumulation

of abnormal numbers of chromosomes in one cell. A lack of proper spindle development may be associated with the increased viscosity. Inasmuch as the polyploidy seen in various plant and animal tissues which commonly follows the administration of colchicine is attributable to suppression of spindle formation in mitosis and the consequent lack of distribution of the divided chromosomes, it seems probable that the division of chromosomes without polar distribution so evident in cells severely centrifuged may likewise be due to the prevention of spindle development.—*Auth. (courtesy Wistar Bibl. Serv.).*

3447. SEMMENS, C. S., and P. N. BHADURI. A technic for differential staining of nucleoli and chromosomes. *Stain Technol.* 14(1): 1-5. 3 fig. 1939.—A procedure is descr. which enables a stain to be located in the substance of the nucleolus:—Fix in either Navashin or Levitsky; stain the chromatin by means of de Tomasi's improved Feulgen technic and bring the preps. through the washing solns. down to distilled water; then keep it in a mordant soln. (5% aqueous Na_2CO_3) for at least 1 hr.; wash with water then stain for 10 min. in light green soln. (90% alcohol, 100 cc, light green SFY, 0.5 g., aniline oil, 2 drops, well shaken); differentiate in 70% alcohol sat. with Na_2CO_3 ; treat with 95% alcohol, absolute alc., equal parts xylene and abs. alc., clear in pure dry xylene, and mount in neutral balsam. Cytoplasm and karyolymph should be clear, with magenta chromatin and well defined green nucleoli. The light green does not behave like a simple counterstain as in previous technics but as a definite stain for nucleolar material.—*Auth. abstr.*

PLANT

3448. BECKER, CATHARINE LUNT. Effect of Colchicine on chromosome number and cell size in some horticultural plants. *Proc. Minnesota Acad. Sci.* 6: 26-30. 1938 (1939).—Horticultural plants of several botanical families were treated with Colchicine. Abnormal growth indicated possible chromosome doubling in beans, onions, peas, potatoes, and rhubarb. Similar effects were noted on several vars. of annual and perennial flowers.—*H. K. Wilson.*

3449. RAGHAVAN, T. S. Studies in the Cappariaceae. III. The prochromosomes of *Polanisia trachysperma* Torr. and Gray and *Gynandropsis pentaphylla* DC. *Cytologia* 8 (3/4): 563-578. 30 fig. 1938.—Somatic mitoses in root tips of *P. t.* show prochromosomes directly derived from preceding telophase chromosomes. Study of meiosis in *Gynandropsis*, with full diploid number of prochromosomes, indicates that the chromosome structure and cycle in plants with prochromosomes is essentially the same as in those without.—*H. Hibbard.*

3450. SENN, HAROLD A. Chromosome number relationship in the Leguminosae. *Bibliographica Genetica* 7: 175-336. 1938.—This contribution represents a preliminary survey of the chromosome number relationships in the Leguminosae, including some 233 chromosome number detns. made on 106 spp. of 33 genera, together with a list of the known chromosome numbers in 436 spp. of 74 genera in the family. The following haploid numbers have been determined: 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 30, 32, 40, 48, 65. The basic number for the Papilionatae Senn considers to be probably 8. Certain taxonomic changes are corroborated on the basis of the cytological findings, and the need for other changes is indicated. A hypothetical phylogenetic chart of the family, based on chromosome number relationships, and to a limited extent on morphological relationships, is presented. A primitive 8-chromosome papilionate stock seems to have given rise along at least 4 distinct lines to the present day Papilionatae. The 7-chromosome Viciae probably arose as hypoploids from the primitive 8-chromosome papilionate stock, and the 11-chromosome Phaseoleae may have arisen through hybridization of a tetraploid of the 7-chromosome Viciae line with a diploid of the 8 line. Polyploidy is low in the Leguminosae, only 23% being found to be polyploids or derived from polyploids. The relation of polyploidy to geographic distr. is reviewed and discussed, and doubt is cast on the validity of the view that perennial and woody conditions are primitive. In general, the numerical data on chromosome numbers of the

Leguminosae support Muntzing's conclusions of 1936 that higher numbers are associated with the perennial condition and indicate that in the Leguminosae, at least, some of the woody perennial spp. may have originated from herbaceous annual spp.—*J. M. Beal (courtesy Bot. Gaz.).*

3451. SUITA, NOBUHIDE. Studies on the male gametophyte in Angiosperms. IV. Behavior of the "droplets sheath" in the pollen tube. *Cytologia* 8(3/4): 532-541. 27 fig. 1938.—In living pollen tubes of *Crinum* and *Hippastrum*, grown on sugar agar, the cytoplasmic sheath around the generative nucleus contains small droplets similar to chondriosomes.—*H. Hibbard.*

ANIMAL

3452. BERGER, CHARLES A. Multiplication and reduction of somatic chromosome groups as a regular developmental process in the mosquito, *Culex pipiens*. *Carnegie Inst. Washington Publ. (Contr. to Emb. No. 167)* 27(496): 209-232. 1 pl., 10 fig. 1938.—Multiple complexes of 96, 48, 24, and 12 chromosomes, and the diploid number of 6, were found in the epithelial cells of the pupal ileum during metamorphosis. The metamorphosis of the ileum begins about the 8th hour of pupal life and is completed in 12-14 hours. During the larval period (10 days or more) and the first 6 hrs. of pupal life, the iliac epithelium grows by increase in cell size, not by cell multiplication. When the larva hatches from the egg the nuclei of these cells have a mean diam. of from 3-4 μ . At the time of metamorphosis the greatest diam. of these cells ranges from 10-17 μ . The imaginal epithelium is formed, not from regenerative cells or imaginal disks, but by division and multiplication of the larval cells. The larval epithelium does not undergo histolysis. The new tissue is composed of a larger number of smaller cells. Comparison of larval and adult tissue indicates that each larval cell undergoes 3 or 4 non-synchronous divisions during metamorphosis. At the beginning of the process all the cells are large and the first cells to divide always show one of the higher multiple complexes, usually 96 or 48 chromosomes, at metaphase. At the middle of metamorphosis cells of all sizes and multiple complexes of all sizes are present. The size of the cell is proportional to the number of chromosomes it contains. Towards the end of metamorphosis large cells and large complexes become rare or entirely absent, and smaller cells and complexes of 12 or 6 chromosomes are abundant. In the prophase of the 1st division the diffuse granular "resting stage" condition of the chromosomes gives rise gradually, apparently by synapsis of thin threads, to 3 pairs of long thick compound threads; these condense into 3 pairs of short, thick rods, each of which is evidently composed of 8 or more elements (chromonemata). Each of the 6 groups of sister chromosomes now falls apart into its constituent units. Homologues (or sisters?) now unite in pairs and take up their position on the metaphase plate. The metaphase stage of the 1st cell division commonly shows 24 or 48 of these pairs. Early anaphase figures indicate that chromosomes do not split in these divisions but that pairs separate into their constituent units which pass to opposite poles. This is somatic reduction. Late anaphase figures indicate that by the time the chromosomes reach the poles they have already united again to form half the number of pairs. Early telophase nuclei show thin threads in polar arrangement, and prophases of all succeeding divisions show the same polar groupings of the thin threads and later of the short thick threads or rods. This polar arrangement may indicate rapid successive division with short intervening interphases. This multiplication of chromosomes during the long larval resting stage and the subsequent series of somatic reduction divisions may be a means of effecting rapid metamorphosis of this tissue. Multiple complexes apparently arise by a growth process within the resting nucleus. Chromosome division and cell division, though usually correlated are independent processes. The bearing of these findings on problems of chromosome behavior and of embryonic differentiation is treated in the discussion.—*From auth. summ.*

3453. WEATHERFORD, HAROLD L. Intranuclear crystals in the hepatic cells of Canidae—wolves, foxes, jackals and non-domestic dogs. *Anat. Rec.* 73(1): 29-36. 1 pl. 1939.—In domestic dogs intranuclear crystals were

found in 0 to 2.13% of the hepatic cells; in the prairie wolf (*Canis latrans*), gray fox (*Urocyon cinereo*), American red fox (*Vulpes fulva*), Fennec fox (*Fennecus zerda*), North African jackal (*Thos anthus*), Cape hunting dog (*Lycaon pictus*), and bush dog (*Idicyon venaticus*), crystals were invariably present as hexagonal prisms differ-

ing in size from minute to those long enough to distort the nucleus. Crystallographically they are dissimilar to Hb. Those in the wild Canidae are apparently identical with those in domestic dogs, which are believed to be derived from a purine base.—*Auth.* (courtesy Wistar Bibl. Serv.).

GENETICS

Editors: ORLAND E. WHITE, *Plant*; SEWALL WRIGHT, *Animal*

(See also in this issue Entries 3407, 3440, 3441, 3442, 3448, 3707, 3843, 3988, 4005, 4246, 4282, 4283, 4394, 4774, 4871, 4933, 4963, 4988, 4993, 5054, 5138, 5218)

GENERAL

3454. ROSINGER, KURT E., and ANITA von P. ROSINGER. The number and mendelian ratios of phenotypes and genotypes. *Quart. Rev. Biol.* 13(1): 65-73. 1938.—Tables presenting the numbers and ratios of phenotypes and genotypes for any degree of hybridism are presented, along with the formulas used. The mode of presentation and the rules for deriving the figures are simple and novel.

—H. G. Swann.

3455. SINNOTT, EDMUND W., and L. C. DUNN. Principles of genetics. 3rd ed. xiv+408p. Frontispiece, 147 illus. McGraw-Hill Book Co.: New York, 1939. Pr. \$3.50.—Although the size of this book has not been increased over that of the 2nd edition, much new matter has been included, bringing the subject up-to-date. The chapters relating Genetics to Development and to Evolution have been rewritten and shortened and include recent data with better examples to illustrate the principles. The problems have been placed at the ends of chapters rather than accumulated at the end of the book. References to literature are given. The "Reference Problems" are omitted. The appendix on biometric methods by D. R. Charles has been dropped, but much of this material is included in the body of the text in connection with multiple-factor inheritance, etc. Tables of χ^2 and ρ are added as also a chapter on cytoplasmic inheritance. New material includes discussion of the giant salivary gland chromosomes, radiation genetics, transplantation exps. in analysis of genic effects and statistical methods for study of populations. New evidence on gene locations and chromosome changes in *Drosophila* is given with linkage maps, metaphase chromosomes and salivary chromosome maps. There are drawings of external features of the fly and directions for prep. of food media. Much of the material included in such works as Dobzhansky's "Genetics and the Origin of Species" and Goldschmidt's "Physiological Genetics" is briefly summarized. The bulk of the volume dealing with well-established principles is unchanged.—P. W. Whiting.

PLANT

3456. ADAMS, WILLIAM EUGENIUS. Inheritance of resistance to leaf rust in common wheat. *Jour. Amer. Soc. Agron.* 31(1): 35-40. 1939.—Hope, a variety resistant to leaf rust of wheat (*Puccinia triticina*), was studied in field trials at Raleigh and Statesville, North Carolina, with Leap's Prolific, Fulcaster, and Purplestraw, the 3 leading vars. of wheat in North Carolina. Hope \times Leap's Prolific F_2 showed 81% of the plants below 25% infection. The reciprocal cross gave similar results. The Purplestraw \times Hope F_2 showed 91% of the plants below 25% infection. The Hope \times Fulcaster F_2 showed the greatest resistance of any cross, with 70% of the plants below 4% infection. The F_3 gave rows which were highly resistant, intermediate, and highly susceptible. F_3 families were obtained in each cross which showed less than 5% infection. Varying conditions of soil, climate, time of maturity, and mixtures of physiologic forms made an accurate determination of the facts of inheritance difficult. The results indicate that resistance to leaf rust of wheat is inherited. Infection was detd. according to the scale used in the Office of Cereal Investigations, U. S. Dept. of Agric. by which it is estimated in percentages the number of uredinia actually present compared with the number possible.—W. E. Adams.

3457. BINDLOSS, ELIZABETH A. Nuclear size in plumular meristems of inbred and hybrid maize. *Amer.*

Jour. Bot. 25(10): 738-743. 3 fig. 1938.—A study was made of the plumular meristems and their nuclear volumes in the embryos of 3 maize pedigrees, each consisting of 2 inbred lines and their hybrids. All hybrids displayed heterosis. The size of the plumular meristem in the hybrids appeared no greater than that in the larger parent, thus showing no correlation between greater meristematic mass and hybrid vigor. For each inbred line and hybrid nuclear size was relatively constant, suggesting that it is an inherited trait. A positive correlation of nuclear size and heterosis is suggested by 1 pedigree; in the others no such correlation was demonstrated.—E. A. Bindloss.

3458. GREENLEAF, WALTER H. Induction of polyploidy in *Nicotiana* by hetero-auxin treatment. *Jour. Heredity* 29(12): 451-464. Frontispiece, 7 fig. 1938.—To produce callus tissues and shoots 5 treatments: 1) indole-3-acetic acid in lanoline (1%); 2) yeast extract; 3) anhydrous lanoline; 4) moisture chambers and 5) petroleum jelly were tested on decapitated stems of hybrids of *N. sylvestris* \times *N. tomentosa* and *N. sylvestris* \times *N. tomentosiformis*. Only the hormone treatment was effective. Of 1937 classified shoots 13.7% were tetraploid, about 1% octoploid; it is estimated that 1% of chromosomally unbalanced shoots occurred. Shoots were identified by measurements of stomata, leaf shape and thickness, amount of pollen sterility and chromosome counts. The method proved highly successful also with *N. sylvestris*, *N. tomentosa*, *N. tomentosiformis* and *N. glauca*; less successful with *N. tabacum* (Maryland Mammoth), *N. tabacum* *pupurea*, *N. sylvestris glutinosa*, and *N. glutinosa* \times *N. tomentosa*. It failed in *N. rustica humilis*, *N. paniculata tabaquilla* and *N. undulata*. Much of the success depends upon the vigor and good condition of the plants used. Treatment with hetero-auxin inhibited callus shoot formation in tomato plants.—W. H. Greenleaf.

3459. ZEISLER, M. Über die Abgrenzung der eigentlichen Narbenfläche mit Hilfe von Reaktionen. *Beih. Bot. Centralbl. Abt. A* 58(3): 308-318. 11 fig. 1938.—To find a procedure by means of which the real stigmatic surface could be easily and rapidly delimited, the stigma reactions of Robinson and of Lopriore have been tested for their usefulness and extended. The color reactions of Robinson are not sufficiently reliable in important doubtful cases. The H_2O_2 reaction of Lopriore is useful and without objection. With careful use it is possible by this procedure to delimit the stigmatic surface and to determine the degree of maturity of the stigma as only mature stigmas are able to split off O_2 bubbles from H_2O_2 . The usefulness of this procedure is proven by a series of examples. Especial attention may be called to the behavior of the style of *Castanea sativa* and *Cyclamen persicum*. According to the H_2O_2 reaction only the outermost end of the style is developed as a stigma in both these plants. This result as determined by the H_2O_2 reaction was further confirmed by the anatomical structure of the style. Both species of plants have, within the style, a closed woody mantle which is open toward the tip of the style and only from there the pollen tube can penetrate into the ovary.—*Auth. summ.* (tr. by H. F. Bergman).

ANIMAL (EXCEPT MAN)

3460. ANNETT, H. E. A new ear defect in pigs. An apparent lethal factor. *Jour. Heredity* 29(12): 469-470. 2 fig. 1938.—Two litters of Tamworth pigs in New Zealand contained, in all, 18 normal pigs and 6 pigs with split ears.

The latter were either deformed in the hind quarters or born dead. The former all lived and thrived. The split ear defect appears to be associated with a cleft palate.—*H. E. Arnett.*

3461. BARROWS, E. F. Selection for tail-spotting in the house mouse. *Jour. Exp. Zool.* 80(1): 107-111. 1939.—Selection for increased amt. of white on the tail was effective in this strain of mice even after elimination of genes for both piebald and variegated. Attention was called to the value of reverse selection in establishing a homozygous strain.—*Auth. (courtesy Wistar Biol. Serv.).*

3462. BEADLE, G. W., EDWARD L. TATUM, and C. W. CLANCY. Food level in relation to rate of development and eye pigmentation in *Drosophila melanogaster*. *Biol. Bull.* 75(3): 447-462. 1938.—In the development of larvae of *D. m.* an organizational change takes place at about 70 hours after egg laying (25°C). Larvae deprived of food after the 70-hour change are probably somewhat accelerated in development. Periods of complete removal of food from vermilion brown larvae are without apparent effect on eye pigment production. This is true whether the starvation period be short or long and whether it comes before or after the 70-hour change. Partial starvation of larvae, under certain conditions, greatly increases the amount of eye pigment formed by vermilion brown flies. The period of development most sensitive to this "starvation effect" on pigment production by the eye lies shortly before the 70-hour change. The production of a supposedly specific eye color hormone, v^+ hormone, can be influenced greatly by the amount of food given to vermilion brown larvae during a limited period of development, the period of maximum sensitivity referred to above.—*G. W. Beadle.*

3463. BITTNER, JOHN J. The genetics of cancer in mice. *Quart. Rev. Biol.* 13(1): 51-64. 1938.—This paper reviews the hypothesis that susceptibility to cancer involves one gene and that it behaves like a recessive. An analysis of some of Miss Slye's data is presented, attempting to show that her support of the above theory does not follow from her presented data. Other data are reviewed, including those on mammary gland tumors, leukemia and lung carcinoma, which do not support the theory that susceptibility to cancer is simply a matter of one gene. There is also some evidence in favor of the hypothesis that "extra-chromosomal influences" (as in breast milk) may modify the inherited susceptibility to cancer. The importance of using homozygous stocks of mice in this problem is stressed.—*H. G. Swann.*

3464. BRIERLEY, JEAN. An exploratory investigation of the selective value of certain genes and their combinations in *Drosophila*. *Biol. Bull.* 75(3): 475-493. 1938.—The influence of individuals or types on the evolution of their race is measured by the "selective index," which is the ratio of the size of their families to the mean time between generations. 19 genes in *Drosophila*, and their various combinations in groups of 3, were compared with one another and with those of wild-type flies as to their effects on longevity, fecundity and rapidity of production. From these combinations the effects of single genes could be isolated, in so far as the numbers of offspring made the comparisons reliable. A gene which increased this index singly and in most of its combinations was regarded as influential in an evolutionary sense. In this category were the genes w^e , pr , and st . Usually, but less strikingly, useful were Cy and gl . The value of bw , ca , D , ey , h , ru , v , w and y appeared to depend on what other genes were present. Others, including ct^1 , b , m , e^s and vg had a weakening effect in nearly all of their combinations. There was, however, great variability among the individuals tested; hence some of the genes not definitely classed as beneficial or detrimental may belong in one of those groups.—*A. F. Shull.*

3465. CRAFT, W. A. The sex ratio in mules and other hybrid mammals. *Quart. Rev. Biol.* 13(1): 19-40. 1938.—The data are collected and discussed concerning the sex ratios among various hybrids of the Equidae and the Bovidae. Miscellaneous hybrids are also mentioned, including those from different families of canines, mice, goats, sheep, pigs, rabbits, swine, monkeys, etc. The fetal sex ratios, sterility, criteria of hybridity and fertility of the mule are also discussed. In general, ♀ hybrids exceed ♂ in number; in mammals ♂♂ appear to be conceived more often than ♀♀. It is suggested that the fetal death toll

generally falls heavier on the ♂ and that this is due to the action of at least 3 factors: (1) sex-linked lethal genes in some instances; (2) since the Y-chromosome apparently does not in general carry genes, the ♂ may receive fewer dominant genes than the ♀ and therefore may be actually weaker in some cases; (3) evidently maleness imposes a higher rate of metabolism than femaleness and this may become a deleterious force.—*H. G. Swann.*

3466. HASKINS, CARYL P., and JOSEPH P. DRUZBA. Note on anomalous inheritance of sex-linked color factors in the Guppy. *Amer. Nat.* 72(743): 571-574. 1938.—The authors have for a number of years been engaged in the prep. of stocks of the viviparous Poeciliid *Lebistes reticulatus* for studies of crossing-over between the X and Y chromosomes under x-irradiation. A considerable number of stocks have been selected from domestic American material for various color factors which behave as though of single-factor type and as though located in the Y chromosome, and some of the Winge's Y-chromosome factors, kindly supplied by him, have been used. In addition, selection has been made for 1 or 2 single-factor autosomals, affecting scale pigmentation. A description has been given of the anomalous behavior of the Y-chromosome character named Maculatus by Winge, leading to the belief that ♀♀ of this stock may be of XY genetic composition.—*C. P. Haskins.*

3467. PHILLIPS, RALPH W., R. G. SCHOTT, and E. M. GILDOW. Longer range paternity in sheep. *Jour. Heredity* 29(12): 471-474. 2 fig. 1938.—Ram semen was shipped by air and rail express from Beltsville, Maryland, to Moscow, Idaho, 2600 miles. Semen was placed in small vials, covered with mineral oil, and packed with crushed ice and absorbent cotton in vacuum bottles for shipment. 60 inseminations were made and 5 ewes produced lambs. Of 17 inseminations made with semen under 48 hours old 4 were successful. Of 20 with semen 48-72 hours old 1 was successful, this one being at 72 hours. The 4 rams used in this work required 2.6 services per pregnancy in natural service at Beltsville, as compared with 7.4 inseminations for all semen used within 72 hours after collection and 4.2 for that used under 48 hours. A graph shows the change of temp. in vacuum bottles as packed for these shipments.—*R. W. Phillips.*

3468. WHITING, ANNA R. Mutant body colors in the parasitic wasp *Habrobracon juglandis* (Ashm.) and their behavior in multiple recessives and in mosaics. *Proc. Amer. Philos. Soc.* 80(1): 65-85. 9 pl. 1939.—Wild type individuals vary from honey yellow to almost black. This is due primarily to temp., higher producing more yellow, lower, more black. Heredity plays some part for races under constant temp. may differ consistently in pigmentation. Wild type ♂♂ and those of the 3 body color mutant types, black, honey and lemon, as well as the 4 combinations of these, were reared under 4 conditions of temp. and humidity. These were A, 30° C, 33-39% rel. humidity; B, 30° C, 81%; C, 19° C, 33% and D, 19° C, 81%. Wasps in A and B developed at the same rate and were alike in pigmentation and size, those in C and D were slower due to lower temp. Those in C were slower than D, of the same color, but larger in size. Any lightening which the shorter cycle of D may have caused was cancelled by darkening due to smaller size. More black pigment is produced at lower temps. in all types except honey; that increase of black pigment due either to environmental or to genetic factors is accompanied by decrease in intensity of yellow. These facts are discussed in light of Wright's theory of pigment formation. He postulates 2 enzymes, I, necessary for all color, which, acting in combination with chromogen, produces yellow, and II, which can act only with I and, as I-II with chromogen, produces black. By supposing that honey represents a reduction of enzyme II, black an increase of II and lemon a reduction of I, the appearance of the multiple recessives can be predicted as well as their behavior under different temp. conditions. Animals which are mosaic for body colors are described. In all combinations obtained thus far, each region is autonomous.—*Auth. abst.*

MAN

3469. BAILEY, S. d'A. A pedigree of syndactylism. *Jour. Heredity* 29(12): 467-468. 2 fig. 1938.—A family is described in which syndactylism varies from the possession of 4 ordinary fingers and 5-fingered hands to one extreme

case of a man with but 2 digits on each hand. A pedigree chart of 6 generations is shown. The trait is regarded as a simple dominant, variable in expression.—*L. M. Dickerson.*

3470. KEHL, H. Über die Erbllichkeit der Myopie mit besondere Berücksichtigung der Blutsverwandtschaft der Eltern. (The inheritance of myopia, with special reference to the consanguinity of the parents.) 31p. K. u. R. Hoffmann: B-Charlottenburg, 1938.

3471. KREIENBERG, W. Die Auswirkungen des Gesetzes zur Verhütung erbkranken Nachwuchses an dem Krankenbestand der Psychiatrischen und Nervenklunik Erlangen. (The operation of the law for the prevention of hereditarily ill offspring; from the records of patients in the psychiatric and nerve clinic at Erlangen.) 22p. Hofer & Limmert: Erlangen, 1937.—*R. R. Willoughby (courtesy of Psych. Abst.).*

3472. LODBERG, C. V., and EJLER HOLM. A pedigree of monochromasy. *Acta Ophthalmol.* [Copenhagen] 16(4): 524-527. 1938.—Several cases of monochromasy were found on an island in the Limfjord with about 1700 fairly isolated inhabitants. Four cases belonged to one pedigree and 19 to another composed of 300 individuals. The latter fell into 2 subgroups descending from a brother and sister. Among the progeny of the sister, 2 cousins married 2 sisters. In one case 5 out of 11 siblings became monochromats, and in the other case monochromasy appeared in 3 generations. A great recessive surplus was found e.g., 23 monochromats with 39 normal siblings.—*J. H. Allen.*

3473. McFETTERS, J. W. Morbid inheritance in an isolated rural community. *Brit. Med. Jour.* 1939(4074): 218-220. 1939.—This article is a synopsis of the Hastings prize essay, awarded by the Brit. Med. Assoc. It presents the results of several years of study of the rôle of heredity

in 8 diseases. The families had been resident for many generations in a small community. There had been little moving from the locality and some consequent inbreeding. Students of inheritance will find the material an interesting contribution and realize the desirability of further studies of family trees where information is available.—*J. B. Paton.*

3474. SPENGLER, J. J. Seed beds of America. A review of "Problems of a Changing Population." *Jour. Heredity* 29(12): 475-488. 5 fig. 1938.—This is a critical review of a recent report, *The Problems of a Changing Population*, prepared under the direction of the secretary of the Population Association of America. Supplementary material and opinions of the author which are introduced will make the article of particular interest to students of population and related social problems.—*L. M. Dickerson.*

3475. STERN, E. Zur Frage der Schwachsinnursachen. *Gesundh. u. Wohlf.* 17: 519-527. 1937.—Of 487 feeble-minded children in Paris, 100 were studied in some detail from the point of view of the causes of their feeble-mindedness. Feeble-minded parents were found in 4-6% of the cases (or in 10%, if mild degrees are included); premature births in 11% of the cases; forceps births in 10%; asphyxia in 13%; alcoholism of the parents or grandparents in 45%; syphilis in the parents in from 37.5 to 45%. The early development of intelligence is probably connected with the development of the motor system (walking, standing, talking). Motor immaturity appeared in 65% of the cases. The age of the parents seems to play a rôle only in mongoloid cases. There were endocrine disorders in 30% of the cases; lowering of basal metabolism (by more than 10%) in 10%; disorders of capillary development in 15%; and interferometric disorders in 90%.—*P. L. Krieger (courtesy of Psych. Abst.).*

BIOMETRY

JOHN W. GOWEN, *Editor*

(See also in this issue Entries 3412, 5028)

3476. ALLEN, NORMAN. Some applications of mathematics to an insect life-history study. *Jour. Econ. Ent.* 31(6): 719-722. 1938.—A life-history study of the turnip aphid, *Rhopalosiphum pseudobrassicae*, was used to illustrate the effective use of index numbers in reducing data to purely relative values for comparative purposes, thus enabling the plotting of 2 or more sets of variables to one scale. Data are presented to show how the index numbers were obtained and the results are illustrated.—*N. Allen.*

3477. CLARK, ANDREW, and WARREN H. LEONARD. The analysis of variance with special reference to data expressed as percentages. *Jour. Amer. Soc. Agron.* 31(1): 55-66. 1939.—It is necessary to apply a transformation, $p = \sin^2 \theta$, to certain types of discrete and percentage data where it is proposed to combine the data for the determination of a generalized standard error. Bunt data originally published by S. C. Salmon are employed to illustrate the transformation which indicates that the majority of the data are sufficiently homogeneous as to admit combined treatment. A sampling technic of using the plant rather than the head is recommended. Homogeneity tests are necessary if a generalized standard error is to be a valid measure of variability in the aggregate data.—*A. Clark.*

3478. FISHER, R. A. Statistical methods for research workers. 7th ed. 356p. Oliver and Boyd: London, 1938. Pr. 15s.—This edition has a fuller explanation of orthogonal polynomials and a new section on the use of multiple measurements to form the best possible discriminant functions.—*J. B. Paton.*

3479. SMITH, G. M. A simplified guide to statistics. x+70p. Farrar and Rinehart: New York, 1938. Pr. 60 cents.—This pamphlet brings together the more useful statistical tools and concepts for students in general and laboratory courses. The contents include an introduction and chapters on the distribution of scores, measures of central tendency, measures of deviation, the use of norms and grading "on the curve," standard scores for comparing and combining test results, percentage of a normal distribution between means, and correlation techniques. Tables of areas under parts of the normal curve, of chances in 100

that the true difference between means is greater than zero, and of squares and square roots of numbers from 1 to 1000 are included.—*J. McV. Hunt (courtesy of Psych. Abst.).*

3480. YULE, G. UDNY. On some properties of normal distributions, univariate and bivariate, based on sums of squares of frequencies. *Biometrika* 30(1/2): 1-10. 1938.—If the distribution of a normal variate has standard deviation σ and the total integral $\int y dx = N_1$, y^2 has also a

normal distribution with standard deviation $\frac{\sigma}{\sqrt{2}}$ and integral $\frac{N_1^2}{2\sigma\sqrt{\pi}}$.

This suggests that, if N_2 is the sum of squares of class frequencies, a good estimate for σ might be

$$\sigma_e = \frac{N_1^2}{2\sqrt{\pi}N_2}, N_2 \text{ being of course the sum of class frequencies.}$$

σ and σ_e are compared for several series of statistics; their agreement is an inadequate test for normality. An example indicates that increased coarseness of grouping causes an increase in σ_e comparable to that of σ without Sheppard's

correction. $k = \frac{N_2}{N_1^2}$, which Yule called the "Concentration,"

indicates the extent to which frequency is piled on to a few intervals. For a strictly normal distribution the standard error of σ_e is about one-ninth more than that of σ . Deviation from normality markedly changes this fraction. Similar considerations for bivariate distributions lead to the equation

$$(1-r^2)^2 = \frac{\text{Sum of squares of independence frequencies}}{\text{Sum of squares of actual frequencies}}$$

This suggests using K as an estimate for the coefficient of contingency, where $(1-K^2)^2 = \frac{N_1N_2^2}{N^2} \times \frac{1}{N_2'}$,

N_1, N_2' being the sums of squares of frequencies for x_1 and x_2 respectively, and N_2' the sum of squares of frequencies for both variates. This suggestion turns out to have little value.—*E. S. Allen.*

ECOLOGY

Editors

W. C. ALLEE, *Terrestrial Animal Ecology*
G. D. FULLER, *Terrestrial Plant Ecology*
CHANCEY JUDAY, *Hydrobiology (Oceanography, Limnology)*

FREDERICK A. DAVIDSON, *Ecology of Wildlife Management—Aquatic*
W. L. MCATEE, *Ecology of Wildlife Management—Terrestrial*

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Selection in social insects, 3442; Hibernation, 3543; Aerial vs. aquatic oxygen consumption, salamanders, 3778; Bioclimatics, 4108, 4109, 4816; of estrus in rat, 3960; of wheat bunt, 5006; of screwworm fly abundance, 5058; Dispersal of cotton flea hopper, 5029; Conjugation and food abundance, paramecium, 5099; Crowding effects in protozoa, 5103, 5104; Bird communities, S. Russia, 5177; Mammals, 5219, 5239; Pine mouse, 5231; Wood rat, 5236; Life zones of Vermont mammals, 5242. [PLANT ECOLOGY]: Ecology in paleobotany, 4723; Algae, 4730; Pteridophytes of India, 4755; Ferns of India, 4756; Vegetation of Lake Superior region, 4796; Ecological anat. of leaves, 4803; Water resources, Arkansas, 4821; Range vegetation in Wyoming, 4851; Afforestation in England, 4900; Salt tolerance, 4935; Water relations of swamp plants, 4940)

GENERAL

3481. DAVIS, C., M. F. DAY, and D. F. WATERHOUSE. Notes on the terrestrial ecology of the Five Islands. I. *Proc. Linn. Soc. N. S. Wales* 63(5/6): 357-388. 6 pl., 8 fig. 1938.—The Five Islands, near Port Kembla, N.S.W., were chosen for an ecological survey because certain factors peculiar to islands appeared to be intrinsically interesting and because it was hoped that the terrestrial life of the islands represented a more or less self-contained unit. This paper treats of the geological and physiographical history of the islands, the climate, the plant ecology, and the various ways in which the islands fail to represent "closed" communities. The departure from the ideal closed community is due to products of littoral and pelagic communities, and of terrestrial communities from the mainland, becoming involved in the food-chains of the terrestrial life of the islands. Habitats for terrestrial animals, other than those embraced by communities of vascular plants, are listed.—*Authors*.

3482. DUNMORE, F. W. An electric hygrometer and its application to radio meteorography. *U. S. Jour. Res. Nation. Bur. Standards* 20(6): 723-744. 22 fig. 1938.—This paper, in the nature of a progress report, deals with the development of an electric-type hygrometer without moving parts or appreciable lag. This makes possible a more rapid ascent and humidity measurements can be made at higher altitudes. This type of hygrometer appears to offer a new tool for measuring humidity in the upper air. Further flight tests and the development of means of calibration at low temps. are all that is now needed to adapt the apparatus to routine measurements.—*Courtesy Exp. Sta. Rec.*

3483. GAMS, H. Neue Arbeiten über das Klima der letzten Eiszeit. *Bioklimatische Beiblätter* 5(4): 159. 1938.—A review of recent papers by Beck, Firbas, Gams, Gross, Hyppä, Oberdorfer, Penck, and Schüttrumpf.—*H. Landsberg*.

3484. GUNN, D. L., and C. A. COSWAY. The temperature and humidity relations of the cockroach. V. Humidity preference. *Jour. Exp. Biol.* 15(4): 555-563. 1938.—In a diffusion gradient of humidity at uniform temp., some cockroaches (*Blatta orientalis*) tend to spend more time in the drier region. Other individuals seem indifferent to the stimulus of air humidity. On desiccation, cockroaches tend to become hygro-positive. In a temp. gradient, those individuals which react to humidity have a slightly but significantly higher preferred temp. in somewhat moist air than they have in dry air. It seems, then, that the observed preferred temp. represents a kind of balance between a pure temp. reaction and a humidity reaction. The change in humidity reaction resulting from desiccation is qualitatively satisfactory to explain the fall in preferred temp. which occurs at the same time.—*Auth. summ.*

3485. MERKER, E. Der Einfluss kurzweiligen Lichtes auf die Tierwelt. *Bioklimatische Beiblätter* 5(4): 167-173. 1938.—A review of 46 papers of the author and his collaborators covering the period 1921-1938. After an introduction the first chapter deals with the visibility of u.-v. by invertebrates and vertebrates, Chap. 2 with the harmful effects of irradiation with short wave-lengths, and Chap. 3 with the influence of light in conjunction with other environmental factors.—*H. Landsberg*.

3486. PEARL, RAYMOND. The natural history of population. viii+416p. Oxford University Press: New York. 1939. Pr. \$3.50.—This book is devoted to an analysis of the more directly biological factors and forces involved in the natural history of populations. It discusses the basic pattern of human reproductivity, and discusses the ways in which it differs from that of lower animals. The fertility differentials in the U. S. relative to race (Negro versus White) and to the 3 social class differentiations are found to be due primarily to differences in the relative prevalence and effectiveness of the efforts made to prevent conception aided by the postponement of marriage and the practice of criminal abortion. The economic and social consequences of the present trends in world populations are discussed as is the significance of population density in relation to war. The book is based upon a wealth of case histories and is well illustrated by tables and graphs. It contains a bibliography of 700 titles.

3487. PIERCE, W. DWIGHT, and DOROTHY POOL. The fauna and flora of the El Segundo sand dunes. 1. General ecology of the dunes. *Bull. Southern California Acad. Sci.* 37(3): 93-97. 1938.—The initial report in a projected series of papers describing the life in a restricted sand dune area of Los Angeles Co., California. Thirteen areas of distribution are defined, in which 75 spp. of plants have been studied. The commoner plants are listed according to the portions of the dune on which they are found.—*W. D. Pierce*.

3488. RANT, A. Der Ameisenbaum *Endospermum moluccanum* (T. et B.) Becc. und seine Ameisen. *Ann. Jard. Bot. Buitenzorg* 48(3/4): 123-128. 3 pl. 1938.—Two spp. of *Endospermum* (Euphorbiaceae)—*E. moluccanum* and *E. formicarum*—are found in the eastern part of the Malay Archipelago. The stems of both are inhabited by the ant *Camponotus quadricaps*. Experimentally it was shown that *Camponotus* is unable to live in other myrmecophilous plants, such as *Acacia spadicigera*, *Cecropia palmata* and *Myrmecodia echinata*. *Endospermum* is not damaged by the ants; they bore only in the pith of the stem. The walls of the cavities formed by the ants are soon covered by moulds, but these are not cultivated by the ants.—*A. Rant*.

3489. TRAPP, E. Untersuchungen über die Verteilung der Helligkeit in einem Buchenbestand. *Bioklimatische Beiblätter* 5(4): 153-158. 5 fig. 1938.—Measurements were made with Lange photocells with platinum-opal filters in a beech forest of 120 to 150 year old trees, average height 28 m., on a slope with 20° inclination toward the SE, near the Alpine Biol. Station, Lunz, altitude 800 m. During Aug., when the trees were in full foliage, on bright days at noon the brightness on the floor of the forest was 6% of the outside value, on dull days 4%. The vertical brightness distribution in the forest is a steep exponential function decreasing from 100% above the tree tops in the first 5 m. of the foliage to less than 20%. A chart of the foliage density and the distribution of brightness on dull days shows their close resemblance. The brightness distribution on dull days also shows a correlation to the surface flora. On bright days the light distribution in the forest is very patchy and not readily accessible to a generalizing analysis.—*H. Landsberg*.

3490. TURNAGE, WILLIAM V., and EDITH B. SHREVE.

Note on atmospheric aridity. *Ecology* 20(1): 107-109. 1 fig. 1939.—Preliminary calibration of the Livingston white, spherical, porous clay atmometer against environmental factors is presented. Curves show the relation of evaporation to wind velocity for various depressions of the wet bulb. The difficulty of measuring wind velocity and the error involved in treating arithmetical averages of wind movement against a factor related in a non-linear manner to wind movement are noted.—W. V. Turnage.

ANIMAL

3491. BERTELSEN, E. Contributions to the animal ecology of the fjords of Angmagssalik and Kangerdlugssuaq, in East Greenland. *Meddelelser om Grønland* 108(3): 1-58. 2 pl. 1937(rec'd 1-24-38).—The composition of the characteristic fauna of the tidal zone and at small depths the euryhaline littoral fauna seems to be detd. by the ability of the forms present to adapt themselves to the very varying salinities of the upper layers. In the Kangerdlugssuaq area this is characterized by the absence of molluscs and *Balanus balanoides*. In the more southernly area of Angmagssalik *Littorina rudis* and *Arenicola marina* are found, in addition to *Mysis oculata* and the characteristic amphipoda. Characteristic of the euryhaline littoral fauna of both areas is the absence of infauna molluscs and echinoderms. In the investigated areas of Angmagssalik, the *Venus fluctuosa* community is found in sandy localities near river mouths in the fjords at depths ranging from 4 to 25 m. The *Macoma calcaria* community is typically developed in the inner fjords of the Angmagssalik area on clay bottoms from 4-5 down to 50 m. In Uttental Sound in the kangerdlugssuaq area the *Arca-Astarte crenata* community seemed to have partially replaced the *Macoma calcaria* community, since here it occurred in a somewhat modified form up to 25-30 m. From 3-5 m. down to the lower limit of the vegetation the epifauna of the vegetation is characterized by *Modiolaria laevigata*, *Margarita groenlandica* and *Harmothoe imbricata*. The epifauna of the stones is everywhere dominated by ascidians, bryozoans and sponges. In addition *Pista maculata*, *Ophiacantha bidentata*, *Saxicava arctica*, *Trichotropis conica* and *Stegocephalus inflatus* are characteristic constituents. The main part of the Nekthobenthos consisted of spp. of *Spirontocaris* and some few fish spp.—The quantitative bottom samples collected showed that the density of the shallow water communities in the Angmagssalik area is high.—E. Bertelsen.

3492. DAVIS, W. B., R. R. RAMSEY, and J. M. ARENDALE, Jr. Distribution of pocket gophers (*Geomys breviceps*) in relation to soils. *Jour. Mammal.* 19(4): 412-418. 1938.—On the 75-acre tract studied, pocket gophers occur only in soils of the Lufkin and Ochlockonee series, both of which have deep, sandy surface soil. They are absent from the Wilson clay loam and usually from the Ochlockonee silt loam. Pocket gophers require at least 4 inches of sandy top soil in which to burrow, particularly where the subsoil consists of plastic, sticky, impervious clay into which they do not penetrate; they do not occur in the Lufkin soils where the soil of the A horizon is less than 4 inches deep; absence of pocket gophers from hill sides where the soil is of the Lufkin series probably is a good indicator of excessive sheet erosion. The average depth to which pocket gophers burrow in the vicinity of College Station, Texas, is 7.84 inches; the average diam. of the burrows is 2½ inches. The pH value of the soil is not correlated with the distribution of pocket gophers; they are as successful in very acid soil as in neutral or basic soils. In the area studied pocket gophers never extend their burrows into the clay subsoil; their activities are restricted entirely to the A horizon. The average density on the 75 acre tract was 0.67 gophers per acre; excluding all non-inhabited areas, the density was 1.35 gophers per acre. These figures are thought to be close to the average for the Lufkin fine sandy loam in Brazos County. The highest density record available for Texas is 6.8 gophers per acre in deep Norfolk sandy soil.—Auth. summ.

3493. ENDERS, ROBERT K. Changes observed in the mammal fauna of Barro Colorado Island, 1929-1937. *Ecology* 20(1): 104-106. 1939.—Observations extending over

8 years indicate that the mammal fauna was fairly stable up to 1932. Since that date the numbers of puma, ocelot, collared and white lipped peccary, and tapir have decreased while the monkeys, armadillo, three-toed anteater and terrestrial rodents have increased. These changes may have been brought about by poachers.—R. K. Enders.

3494. GOMPEL, M. Recherches sur la consommation d'oxygène de quelques animaux aquatiques littoraux. *Ann. Physiol. et Physicochim. Biol.* 14(5): 914-932. 1938.—The oxygen consumption of animals living on a sea-shore varies rhythmically with the tide; the maximum coincides with the flow, the minimum with the ebb. This rhythm is characteristic for all classes of littoral marine animals.—J. W. Langelaan.

3495. GRINNELL, JOSEPH. Effects of a wet year on mammalian populations. *Jour. Mammal.* 20(1): 62-64. 1939.—Observations made on numbers and distribution of rodents and rabbits in northeastern California following a flood season led to the conclusion that sudden and irregular local floods are highly important in causing non-cyclic fluctuations in populations of rodents which live in the southwestern U. S.

3496. HATFIELD, DONALD M. Studies on rodent populations in a forested area. *Jour. Mammal.* 19(2): 207-211. 1938.—Seven quadrats were staked out in various of the forest types to be found in northern Minnesota. Each of these quadrats, 24 feet square, was set with 25 snap traps separated by 6-foot intervals. Under these conditions, 2250 trap nights resulted in the capture of 110 rodents. *Peromyscus* was most frequently represented, with *Clethrionomys* 2d and *Zapus* 3d. Greatest numbers of mice were caught in jackpine (*Pinus banksiana*) and open aspen (*Populus tremuloides*) stands. Fewest were taken in a spruce-balsam (*Picea canadensis*, *P. mariana*, *Abies balsamea*) swamp. A comparison of daily catch of *Peromyscus* with minimum temp. reveals a rough correlation; the lower the temp., the fewer the individuals caught.—D. M. Hatfield.

3497. HIGGINBOTHAM, A. CURTIS. Studies on amphibian activity. I. Preliminary report on the rhythmic activity of *Bufo americanus americanus* Holbrook and *Bufo fowleri* Hinckley. *Ecology* 20(1): 58-70. 1 fig. 1939.—Records were taken under normal fluctuations of daylight intensity and in an exptl. cabinet in which temp. and relative humidity were held relatively constant while the periods of illumination were varied. In all of these expts. the movements of the exptl. animals were transmitted to 24-hr. kymograph drums carrying waxed recording paper. Activity records were taken usually for 10 consecutive days. Data obtained under normal fluctuations of daylight, constant light, constant darkness, and reversed illumination indicate an inherent activity rhythm in mature individuals.—A. C. Hugginbotham.

3498. JEWELL, MINNA E. An ecological study of the fresh-water sponges of Wisconsin. II. The influence of calcium. *Ecology* 20(1): 11-28. 1 fig. 1939.—A study of Spongillidae from 157 lakes and 24 streams in Wisconsin shows a marked correlation between the distribution of the various species and the calcium carbonate content of the water, and a less marked correlation between distribution and the Mg content of the water. Experimental rearing of Spongillidae in chemically modified waters indicates that calcium carbonate is important in their distribution whereas $MgSO_4$ is not, when in concs. usually encountered in nature. *Ephydatia mulleri* is absent from both high and low Ca waters. *Heteromyenia argyrosperma* is probably similarly restricted by Ca. *Spongilla fragilis* was found in waters of Ca content varying from 2.08 to 18.6 mg. per liter. *H. repens* and *H. ryderi* are both tolerant of a wide range of Ca content. *Tubella pennsylvanica* is restricted to waters of low Ca content. *Spongilla inglovisformis* is the most Ca sensitive of the spp. studied. *Ephydatia everetti*, although collected only from waters of low Ca content, was able to grow and form gemmules after transfer to waters of much higher Ca content. *Spongilla lacustris* was the only species which flourished in spite of rapid marl or travertine deposition.—M. E. Jewell.

3499. KUNZ, HELMUT. Die sandbewohnenden Copepoden von Helgoland. Teil I (Studien an marinem Copepoden II). *Kieler Wiss. Meeresforsch.* 2(2): 222-255. 12 fig.

1938.—5 sand zones (Biotopes) are recognized and described as coeped habitats. The taxonomic arrangement of the group is reviewed with emphasis on the biotopes occupied, and general range, as well as specific and comparative measurements and drawings of the species found in this investigation with suggested keys for the genera.—*W. M. Morton.*

PLANT

3500. AIKMAN, J. M., and A. W. SMELSER. The structure and environment of forest communities in central Iowa. *Ecology* 19(1): 141-150. 3 fig. 1938.—Shrub, oak-hickory and maple-linden communities are well established on the rough land bordering streams near the center of the prairie association in central Iowa. Of the factors affecting plant growth, the following are highest in the prairie and progressively lower from the shrub community through the oak-hickory to the linden-maple: mean air temp., mean soil temp., radiant energy, evaporation and wind velocity. Relative humidity and available soil moisture during favorable seasons are lowest in the shrub and highest in the maple-linden. The total difference in factors is made up of the modifications caused by topographical differences and those caused by the protection afforded by the plants of the community. As compared to the maple-linden community, the oak-hickory has a greater number of dominant spp. and of individual trees but the trees are smaller, the canopy less dense and the undergrowth more abundant. The influence of high N content and plant-cover density of mature prairie soils in the maintenance of prairie vegetation is emphasized by the observed invasion of shrubs and trees on the slopes of newly formed gullies of lower N content and of less dense plant cover.—*J. M. Aikman.*

3501. CROXTON, W. C. A study of the tolerance of trees to breakage by ice accumulation. *Ecology* 20(1): 71-73. 1939.—A bad sleet storm in 1937 caused great damage to trees in Missouri and Illinois. Among the most damaged were *Betula alba*, *B. lutea*, *Ulmus americana*, *Populus* spp., *Acer saccharinum*, and *Platanus occidentalis*. Among the most resistant were *Carya ovata*, *Tsuga canadensis*, *Quercus alba*, *Thuja occidentalis*, *Juglans nigra*, *Pseudotsuga taxifolia*, and *Gleditsia triacanthos*. Other spp. showed a varied amount of damage.—*W. C. Croxton.*

3502. FRASER, LILLIAN, and JOYCE W. VICKERY. The ecology of the Upper Williams River and Barrington Tops districts. II. The rain-forest formations. *Proc. Linn. Soc. N. S. Wales* 63(3/4): 139-184. 7 pl. 1938.—The sub-tropical rain-forest consists largely of trees, no one of which becomes dominant. The tree stratum is continuous and characterizes the formation; the shrub and herb strata are discontinuous and scanty. Many of the spp. show Indo-Malayan affinities. Variation in the composition of the forest is largely due to change, although in special cases it may be due to variations in the habitat. The sub-tropical rain-forest is advancing over the adjacent Eucalypt forest, the rate of advance being governed by local conditions such as aspect and drainage. Species features such as the presence of lianes and epiphytes, buttressing of the tree trunks, and leaf and seed characters are discussed. Regeneration of the forest after partial destruction is considered. The sub-antarctic forest is dominated by *Nothofagus moorei*; a few other trees, some of them intrusive from the sub-tropical rain-forest, may be present in small numbers. Shrub and herb strata are extremely scanty. Lianes and epiphytic ferns and Angiosperms are rare, but there is an abundant development of mosses and lichens on tree trunks and rocks. The sub-antarctic rain-forest is also advancing over the adjacent Eucalypt forest in areas of suitable shelter, but is probably more or less stationary with regard to its contact with the sub-tropical rain-forest, with which it mingles along its lower limits. Margin communities along the boundaries of both rain-forest formations are descr.—*Authors.*

3503. GEORGESCU, CONST. C., și CONST. D. IONESCU. Studiul asupra limitei pădurii spre golul alpin în basinal superior al Ialomiței (Bucegi). [The upper limit of forest in the higher portion of the Ialomița Valley (Rumania).] [With Fr. summ.] *Rev. Pădurilor [Bucharest]* 50(12): 1075-

1093. 8 fig. 1938.—The relation of timber line to topography, aspect, altitude, ground surface, and other factors is discussed.—*W. N. Sparhawk.*

3504. HEUGEBAUER, HANS FRANZ. Zur Ökologie von in Buchenkronen epiphytisch lebenden Flechten. *Beitr. Biol. Pflanzen* 25(3): 273-289. 4 fig. 1938.—The ecology of 6 spp. of lichens (*Parmelia caperata*, *P. fuliginosa*, *P. furfuracea*, *P. physodes*, *P. saxatilis*, and *Usnea dasypoga*) which live epiphytically in the crown of beech trees was investigated. The water content, the water-holding capacity, the water loss, the water intake, the assimilation and the respiration of these spp. were measured. Under certain conditions these lichens can hold an amount of water equal to 3 times their net weight. Certain spp. lose water more rapidly than others because of their form. Lichens do not lose water as rapidly as grey filter paper. *P. furfuracea* loses its water faster at first than *P. caperata* but because of its folding the water loss is retarded and it finally contains a greater amount of water than *P. caperata*. In a supersaturated NaCl soln. *P. caperata* was found to contain water in the amount of 13.5% of its dry weight; *P. furfuracea*, 21.8%; and *Usnea dasypoga*, 23.1%. The greatest assimilation rate was by *P. saxatilis*, with 33 mg. CO₂ per 1 g. of net weight. The assimilation rate of *P. furfuracea* was strongly inhibited during the moist weather while in *P. caperata* and *P. olivaria* the assimilation rate is slightly increased. The respiration of the lichens examined in this research was 2-3 times as great in wet weather as in dry weather.—*G. C. Couch.*

3505. HORIKAWA, YOSHIWO, und WAKASI SATO. Studien über die Lebensformen der Phanerogamen in Japan-Hondo und über den PtpH-Q in Japan. *Jour. Sci. Hiroshima Univ. Ser. B, Div. 2 (Bot.)* 3(art. 5): 57-87. Map, 4 pl. 1938.—Japan-Hondo (Honsyn, Sikoku, and Kyusyu) lies between 31° and 41.5° N. lat. with a mean annual temp. of 13.5° C (9.3° at Aomori to 16.7° at Kagosima) and precipitation of 1660 mm. (994 mm. at Nagano to 2184 mm. at Koti). The climate is continental, from cold to warm temp., and the vegetation ranges from summergreen and conifer forest in the north to broadleaf evergreen in the south. The climate is conspicuously hemicryptophytic (47.38% H. in contrast to only 26% H. for the normal spectrum). Geophytes likewise are outstanding (1.02% G. in contrast to 4% G. for the N.S.). The latter occur mostly in the cold temperate regions and are about 80% Monocotyledons. The greatest deficiency is in Chamaephytes which constitute only 2% of the 3,601 spp. of the flora. The Pteridophyte quotient (PtpH-Q.) is given for 14 Japanese regions. Japan-Hondo with its temperate continental climate has a quotient of about 2.3. The smallest PtpH-Q. is 1.4 for the northern island of Karahuto. The largest PtpH-Q. is 6.2 for the Bonin Islands with their subtropical oceanic climate.—*S. A. Cain.*

3506. LITTLE, ELBERT L., Jr. The vegetation of the Caddo County Canyons, Oklahoma. *Ecology* 20(1): 1-10. 3 fig. 1939.—Four sandstone canyons in Caddo and Canadian counties, west central Oklahoma, have a rich, eastern deciduous forest, in which *Acer saccharum* is dominant and disjunct at the extreme western limit of the species. It is regarded as a relict of a more humid climate. Vegetation of the canyons is described, and lists of 27 trees, 17 shrubs, 10 woody vines, and characteristic herbs are included.—*E. L. Little, Jr.*

3507. MARR, COLIN C. An agricultural survey of the Markham Valley in the Morobe District. *New Guinea Agric. Gaz.* 4(1): 2-12. 1938.—An ecological description of the topography, drainage, elevation, geology, soil, climate, and principal plant life of this New Guinea valley.—*W. D. Pierce.*

3508. MOXON, ALVIN L., OSCAR E. OLSON, WALTER V. SEARIGHT, and KIRK M. SANDALS. The stratigraphic distribution of selenium in the Cretaceous formations of South Dakota and the selenium content of some associated vegetation. *Amer. Jour. Bot.* 25(10): 794-809. Map. 1938.—Composite samples of some Cretaceous rocks of S. Dakota, and samples of plants growing on material derived from Cretaceous rocks, were analyzed for Se. The Smoky Hill member of the Niobrara formation, the Sharon Springs member of the Pierre formation, and, locally, the Moberg

member and a chalky bed in the Upper Virgin Creek member of the Pierre formation, were found to be highly seleniferous. A correlation was found between the Se content of the formations and the Se content and type of plants growing on them.—O. E. Olson.

3509. OBERDORFER, E. Pflanzensoziologische Probleme des Oberrheingebietes. *Ber. Deutsch. Bot. Ges.* 55 (Generalversammlung-Heft): 187-194. 1937.—The upper Rhine valley is a phytogeographical transition zone for many plant species. Many continental Eurasian communities have their western limit here, e.g., the *Stipa* community and the *Pinus sylvestris* "steppe forest" near Mainz. On the rainy slopes of the Oden Forest and of the Black Forest many associations are found which are characteristic of the Atlantic coastal plain. The peculiarities of the "meadow forests" are described. Level land and rich soil is occupied up to an elevation of 500 m. by an oak-hornbeam-red beech climax. It is suggested that the concept climax be applied to a group of associations or plant alliances rather than a single association.—H. C. Beeskov.

3510. PESSIN, L. J. Root habits of longleaf pine and associated species. *Ecology* 20(1): 47-57. 3 fig. 1939.—Excavations were made of more than 120 plants including longleaf pine (*Pinus palustris*) seedlings and grasses and herbs commonly associated with longleaf pine in southern Mississippi and Louisiana. The roots of longleaf pine seedlings often display differences in symmetry under natural conditions owing to the presence in the soil of old root holes and charcoal pockets. Most lateral roots occur within the upper foot of soil, where most of the roots of the grasses and herbs also occur, suggesting the existence of a keen competition in the soil between the pine roots and those of associated plants. Removal of grasses and herbs from an area results in a marked increase in the growth of the pines.—L. J. Pessin.

3511. POTZGER, J. E. Microclimate and a notable case of its influence on a ridge in central Indiana. *Ecology* 20(1): 29-37. 1939.—A study of differences in water loss and soil moisture on north and south-facing slopes of a ridge in Monroe County, Indiana. This ridge is typical of all dissected areas in central Indiana where north slopes have beech-maple and south slopes oak-hickory forest cover. Evaporation on the S slope was 61% greater than on the N slope. Surface soil had 30% and soil at 6 in. depth 28% more moisture on the N than on the S slope.—J. E. Potzger.

3512. REGEL, C. Pflanzensoziologische Studien aus dem nördlichen Russland. VI. *Beitr. Biol. Pflanzen* 25(2): 169-227. 1938.—An ecological study of 2 regions in northern Russia was made. The first area lies between the cities of Archangel and Onega, and the sociological relationships of meadow, forest, moor, and tundra are studied and discussed. Descriptive lists of communities are included, and these areas are carefully described. The 2d area is located between the White Sea and Lake Onega, and between Pertominsk and the sea coast. The communities are described, and the effects of man's activity on these communities is also mentioned.—M. Hopkinson.

3513. SCHARFETTER, RUDOLF. Des Pflanzenleben der Ostalpen. xv+419p. 73 fig. Franz Deuticke: Wien, 1938. Pr. 25.80 glid.—The region is bounded by the Danube and Po on the north and south respectively, a line running through the Lake of Constance and Lake Como on the west, and an irregular one from Pressburg through Agram and Laibach to Trieste on the east. The treatment is technical, requiring for its comprehension some knowledge of both terminology and facts of central European geobotany. It is based on observations during excursions over 30 years and upon a compilation of data from over 1000 references. Chapter 2 (35pages) shows some of the various ways in which the region has been or might be subdivided according to floristic, climatic, sociological, and successional points of view. In the discussion of the vegetation, the communities are grouped according to their floristic affinities into 5 divisions: Mediterranean, the Illyrian, Pannonian, Baltic, and alpine floras. The last chapter (61pp.) traces the migrations and development of the flora and vegetation from early Tertiary time to the present. The bibliography includes sections on geographic works, floras, geobotanical reference works, monographs and maps as well as complete

literature citations. The 73 text figures consist almost entirely of graphs, sketches, and small maps. The appended map, in black and white, shows in considerable detail the boundaries of 20 vegetation formations and 3 agricultural regions.—C. E. Olmsted.

3514. SØRENSEN, THORVALD. Ranunkelstudier. I. Om Vækst og Hvile hos nogle danske Ranunkelarter. II. Om Variation og Nedarvningsforhold hos *Ranunculus auricomus* L. [Studies on *Ranunculus*. I. Growth and rest in some Danish spp. of *Ranunculus*. II. Variation and heredity in *R. auricomus*.] *Bot. Tidsskr.* 44(3): 307-335; (4): 433-438. 1938.—I. Within the genus *Ranunculus* typical representatives of plants with a summer rest period and plants with a winter rest period occur in Denmark. The nature of the rest periods was studied experimentally by cultivation in greenhouses in the winter and in the open during the summer. The rate of growth during the rosette stage was detd. from the number of leaves, and during the following stages from the number of shoot generations. As regards spp. with an induced winter resting period, a distinction is made between 2 growth types: the "annual" type with a constant growth rate, and the "biennial" type, in which the growth rate decreases as the fruiting stage approaches. No absolutely autonomic winter rest was found, though a reduced rate of growth was found in certain spp.; this was regarded as an expression of an intermittent "semi-rest." It is probable that the resting period of the spp. that are dry in summer is not autonomic, but induced by want of moisture and light.—The appendix deals with observations on attacks by Aphididae and their possible importance as determining factors for the ecological demands and geographical distribution of certain spp. of *Ranunculus*.—II. Investigations on the variability of a number of *Ranunculus* spp. within delimited populations showed that the variation in *R. auricomus* is of a different character from that in the other Danish *Ranunculus* spp. reproducing by seed. Populations of *R. a.* either exhibit no variation, or are composed of a few well-defined types. Hybridization experiments with such easily recognizable types demonstrated that the constancy of the types is due to pseudogamy. Pseudogamous reproduction in *R. a.* and *R. cassubicus* was previously demonstrated by Rozanova, whose results are here referred to. The partial pollen sterility associated with the pseudogamy aids in distinguishing between Arctic forms of *R. auricomus* and *R. affinis*, whose systematic position has hitherto been uncertain.—Th. Sørensen.

3515. STEFFEN, H. Gedanken zur Entwicklungsgeschichte der arktischen Flora. *Beih. Bot. Centralbl. Abt. B* 58(2): 141-202. 4 fig. 1938.—The first stage in the development of an arctic-alpine floral element appears to be scarcely any more recent than the arctic flora itself. The question as to the particular glacial period in which certain spp. came to the Alps and other high mountains is discussed as is also the paths of the arctic-alpine floral migration in Europe. To show the influence of different mountains on the flora of particular sectors of the polar region spp. are listed according to the mountain region in which they probably originated and from which they have spread out into the Arctic area. Other lists of spp. which were developed in the arctic or subarctic but which had their origin in the mountains are given. Comments on the probable origin of particular spp. are made in an appendix. Tundra and steppe are shown to be closely related in having certain common ecological characteristics and spp. common to the two formations are listed. At least a diluvial, apparently an old diluvial age, is to be assumed for the relations between steppe and tundra. A floral exchange between steppe and tundra may have occurred by way of high mountain formations or along the larger streams. A few corrections and supplements for the distribution of several spp. are appended.—H. F. Bergman.

3516. WEIMANN, G., and TRG. SCHULZE. Pflanzensoziologische und pollenanalytische Untersuchungen in der Tschocke bei Liegnitz (Schlesien). *Beitr. Biol. Pflanzen* 25(1): 60-74. 3 fig. 1938.—The Liegnitz district, a type of moor, lies 25 km. east of the town of Kuntz. Today the vegetation cover has become flat moorish vegetation abounding in peat, and is of a most monotonous character. The vegetational layers and plant communities are de-

scribed. Tschöcke is an area preserved and protected for conservation, and offers an excellent region for pollen studies. It is compared with other communities studied by Koch. Figures and charts illustrating the types of pollen found in the bogs are included. Pollen of *Abies*, *Picea*, *Pinus*, *Carya*, *Betula*, *Quercus*, and *Alnus* was found.—*M. Hopkins*.

3517. WIGGINS, IRA L. Hanging gardens of the Canary Island date palm. *Madroño* 4(8): 260-263. 1938.—The petiolar bases of the canary date palm support a flora of 30 spp. of annual, and perennial flowering plants and ferns. Seeds lodge in the pockets through the agency of wind, gravity, animal carriers, and direct contact of fruiting plant with the trunk of the tree. Some oak seedlings 9 years of age have been observed in these petiolar cups.—*I. L. Wiggins*.

3518. WIINSTEDT, K. Vegetationen paa Reservatet Vørsø i Horsens Fjord. [The vegetation of the reservation Vørsø in Horsens Fjord.] *Bot. Tidsskr.* 44: 260-306. Map. 1938.—The small island of Vørsø in Horsens Fjord, Jutland, and the surrounding islets, cover an area of about 59 ha., some 43 ha. of which have been set apart as a nature reserve. In the preserved area 3 sample plots, each measuring 400 sq. m., and several fixed lines, all distinctly marked, have been laid out, to facilitate future investigations. The vegetation of one sample plot was examined in great detail, the vegetation of each sq. m. being noted down. Despite the short space of time (6 years) during which the investigations were carried out, it was possible to ascertain changes in the composition of the vegetation of the marked areas, resulting from competition, gradual alteration of the soil, and immigration from the 2 small woods found on the island. Thus certain patches were covered with a luxuriant growth of *Acer pseudoplatanus* and will no doubt in the course of years develop into a wood. On field areas set apart as a reserve, fairly great changes will immediately take place, since the field weeds will be ousted by vigorous spontaneous perennating spp. The paper also gives a complete list of the vascular plants found on the island, and lists the spp. of each community and area of investigation.—*K. Winstedt*.

OCEANOGRAPHY

(See also in this issue Entry 4718)

3519. GRØNTVED, JUL., and GUNNAR SEIDENFADEN. The phytoplankton of the waters west of Greenland. *Meddelelser om Grønland* 82(5): 1-380. 2 pl., 108 fig. 1938.—This is chiefly a taxonomic and distributional study of the various spp. of phytoplankton collected during the Godthaab expedition in 1928. The distribution of the more important forms is indicated on maps and their relative abundance is shown in the tables. Also the composition of the different plankton communities encountered in the different water masses is discussed, and an attempt is made to correlate the plankton variations with the circulation of the water. The distribution of these plankton communities seems to support in all essential details the assumptions of hydrographers with regard to the course of the sea-currents in this region.—*C. Jørgen*.

3520. KEMP, STANLEY. Oceanography and the fluctuations in the abundance of marine animals. *Rept. Brit. Assoc. Adv. Sci.* 108: 85-101. 1938.

3521. PARR, A. E. On the possibility of a biological mechanism controlling the occurrence of the oxygen minimum layer in the sea. *Proc. Amer. Philos. Soc.* 80(1): 49-56. 1939.—A consideration of the densities of plankton particles detd. by Seiwel and Seiwel (1938) indicates that no reasonable or even possible thermal expansion coefficient for such particles would permit them to find a level of equivalent density in the surrounding medium of a natural ocean, at which such particles would accumulate and create an increased oxygen consumption for their decomposition. A consideration of other factors involved in the settling and decomposition of plankton organisms also points quite definitely in the same direction on the basis of the density determinations of Seiwel and Seiwel. If other organic particles should occur with a density differing in so slight a degree from the density of the medium that equivalent densities might be reached at deeper

levels, this condition, with its attendant accumulation, must be attained at or above the level of greatest potential density of the surrounding seawater, that is, at or above the salinity maximum level. Since this is situated above the oxygen minimum layer, the possibility of explaining the latter by an accumulation of decomposing plankton particles seems excluded.—*Auth. abst.*

LIMNOLOGY

3522. BÜREN, G. von. Das plankton. In his *Der Amsöldingersee. Mitteil. Naturforsch. Ges. Bern* 1937: 87-96. 1938.—These plankton observations covered a period of 4 yrs. (1933-37). The phytoplankton was most abundant in the 3-5 m. stratum. It consisted of 5 blue-greens, 5 flagellates, 4 peridinians, 7 diatoms and 6 green algae. The quantity of material was fairly evenly distributed throughout the year and no limiting factor to its production was found. Blue-green and green algae were most abundant in summer, but diatoms were dominant in winter. 2 spp. of *Ceratium* were abundant between Apr. and Oct. The zooplankton consisted of 1 ciliate, 9 rotifers, 3 cladocerans and 2 copepods. The ciliate, most of the rotifers, *Diaphanosoma* and *Diaptomus* were most numerous in summer; *Anuraea* and *Bosmina* were taken in considerable numbers in winter. In their vertical distribution the rotifers and cladocerans were confined chiefly to the epilimnion, but *Diaptomus* was somewhat deeper, chiefly in the thermocline. Down to a depth of 10 m. the total volume of plankton ranged from 5.2 to 26 cm³ per sq. m. of surface, with a mean of 9.5 cm³. A plankton pulse was found in spring during March-April and in autumn in Sept.—*C. Jørgen*.

3523. FISHER, R. A., A. C. FABERGÉ, F. GROSS, A. G. LOWNDES, K. MATHER, E. S. RUSSELL, D. M. S. WATSON. *Artemia salina*. Report of the Committee appointed to investigate the progressive adaptation to new conditions in *Artemia salina*. *Rept. Brit. Assoc. Adv. Sci.* 108: 335-339. 1938.

3524. RILEY, G. A. Limnological studies in Connecticut. *Ecol. Monogr.* 9(1): 53-94. 1939.—Part I contains a general limnological survey of 3 Connecticut lakes, all of them small but thermally stratified in the summer. They are probably moderately productive, but it was impossible to estimate the productivity by the method of hypolimnetic oxygen deficits because of frequent photosynthetic activity in the hypolimnion. The plankton did not show a typical bimodal seasonal curve. Part II is a description of the Cu cycle in the 3 lakes. The seasonal variation was large, the greatest observed range in Cu ion being from 0.004 to 0.099 mg. per liter and the total Cu 0.009 to 0.383 mg. The greatest quantities were found in the autumn. By a series of multiple correlations it was shown that there are at least 5 factors which affect Cu distribution: (a) the diluting effect of precipitation; (b) sedimentation, the removal of Cu from soln. by adsorption on organic matter; (c) regeneration from the mud; (d) liberation from decomposing littoral plants; and (e) liberation by decomposition of plants surrounding the lake. Cu had no ecological significance except during the autumn, when it was occasionally high enough to be toxic to some of the more delicate organisms. The tolerance level of 10 representative freshwater invertebrates was found to range from 0.03 to more than 0.5 mg. of Cu per liter.—*G. A. Riley*.

3525. SCHEFFER, VICTOR B., and REX J. ROBINSON. A limnological study of Lake Washington. *Ecol. Monogr.* 9(1): 95-143. 36 fig. 1939.—A 13-month study was made of an oligotrophic lake bordering Seattle, Washington, 50 sq. mi. in area and 214 ft. deep. Physico-chemical findings were: maximum water temp. 21.85°C at the surface in Aug.; minimum temp. 5.34° below 30 m. in Feb.; a thermocline appearing in June and reaching a depth of 15 m. by Sept.; annual heat budget 43,000 cal./sq. cm. surface; O₂ content relatively uniform at all depths with a minimal saturation of 50% near the bottom in Aug.; free CO₂ from 0.7 to 6.10 mg./l.; pH 6.8-8.6; silicate 0.8-3 mg. Si/l.; phosphate 0.000-0.025 mg. P/l.; nitrate 0.04 to 0.12 mg N per l.; N/P ratio of the water 12/1; no appreciable ammonia or nitrite; total organic material 1-2 mg./l.; total dissolved solids 50-70 mg./l. Biological findings were: average amount of dry plankton 150 mg./cu. m., with an organic

component of 58 mg./cu. m. In the open-water plankton 72 phytoplankters and 35 zooplankters, or a total of 107 spp., were found. Diatoms were predominant, with pulses of growth in May and Nov. Common spp. of Crustacea were *Diaphanosoma leuchtenbergianum*, *Epischura nevadensis*, *Diaptomus ashlandi*, *Cyclops bicuspidatus*, *Pontoporeia filicornis*, and *Neomysis mercedensis*. The plankton population was much the same as 20 years ago, and resembles that of Lakes Erie and Superior. Several bottom organisms and 21 spp. of marginal aquatic plants are discussed briefly.—*Authors.*

3526. WELCH, PAUL S. Vertical distribution of summer temperature in the false bottoms of certain Michigan bog lakes. *Ecology* 20(1): 38-46. 1939.—The vertical distr. of temp. in the false bottoms of 5 northern Michigan bog lakes in summer is presented in the form of graphs and accompanying descriptions. Irrespective of the differences in the types of bog lakes studied, all of the curves have a certain fundamental similarity of form. Only the upper portions of the curves reflect the variations of atmospheric temps. In spite of marked differences in the 2 sets of conditions, there is a fundamental similarity in the form of vertical temp. curves for the bottom deposits of Lake Mendota, Wisconsin, to those presented in this paper. The usual amt. of fall in surface elevation of these bog lakes does not alter the fundamental form of the vertical temp. curve. In the deeper regions of the false bottom, temps. may differ at the same level on the same day at points at various distances apart; likewise, differences occur at similar points and levels on successive observations. Differences in the thermal conductivity of the false bottom materials probably have something to do with these temp. differences.—*P. S. Welch.*

3527. WHITNEY, R. J. A syringe pipette method for the determination of oxygen in the field. *Jour. Exp. Biol.* 15(4): 564-570. 1 fig. 1938.—The water sample to be tested is drawn into the syringe pipette and followed by the usual Winkler reagents. The resulting iodine solution is then titrated by connecting up a special burette with the pipette and drawing in the standard soln. of Na thio-sulphate from the burette. The starch indicator is drawn in before connecting up the burette. The detn. can be completed in the field within 5 min. and the method is more reliable than the ordinary field method since contamination of the water sample with atmospheric air is avoided at all stages. The apparatus is compact and portable.—*R. J. Whitney.*

WILDLIFE MANAGEMENT—AQUATIC

(See also the section "Pisces"; and Entries 3412, 3660, 5152, 5248)

3528. BÜCKMANN, A. Über Methodik, Ergebnisse und Auswertung der Wachstumsuntersuchungen an Nutzfischen. *Cons. Perm. Internat. Explor. Mer Rapp. Procès-Verbaux Réunions* 108(2): x-xv. 1938.—This review summarizes current methods of studying growth rate in sole, cod, and herring in the North Sea and north Atlantic. Difficulties and sources of error in age determination, in estimating body increment from scale measurements and otoliths, along with obtaining representative samples of fishing stock in relation to size and type of net, migrations, time of spawning, etc. are discussed. The potential growth rate of a species varies in geographic races, and with age and degree of sexual maturity. It is affected by temp., food, and fishing intensity. The practical value of growth studies to the fishing industry is stressed, in maintaining a permanently high yield of commercial fish. The author expresses the need for more complete knowledge concerning the growth of the stock, the individual's growth in relation to the general character and size of the stock, and natural mortality.—*J. W. Price.*

3529. DAHL, KNUT. A review of recent salmon marking experiments in Norway. *Cons. Perm. Internat. Explor. Mer Rapp. et Procès-Verbaux Réunions* 108(3): 3-15. 8 fig. 1938.—From salmon marked in 1935, 1936 and 1937, 47, 48 and 40% were recaptured. Fish were tagged at 3 points on the west coast of Norway. Many were retaken near the point of release but long migrations were numerous, including recoveries in the White Sea, Scotland, England and

Sweden. In some instances the fish moved rapidly, one averaging 100 km. a day for 11 days. The greatly dispersed migrations involved fish released on the outer coast. Fish released inside the island belt were retaken in the rivers and fiords in the vicinity of release. Both silver and celluloid tags bearing an address and identification number were used. These were fastened through the cartilage at the anterior base of the dorsal fin with silver wire.—*F. N. Clark.*

3530. HUNTSMAN, A. G. International Passamaquoddy fishery investigations. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 13(3): 357-369. 2 fig. 1938.—A tidal power project on the U. S.-Canadian border threatened the very concentrated local herring fishery. Under an International Commission, hydrographic, phytoplanktonic, zooplanktonic and ichthyological investigations were carried on, the field work being in 1931 and 1932. The detailed reports, published in the *Journal of the Biol. Board of Canada*, represent an intensive attempt to relate a fishery to the physical conditions. Thorough application of current scientific methods failed to solve the problem, revealing present deficiencies in equipment for successful attack on the all-important problem of fish abundance. Arresting facts in addition to the unexplained phenomenal concentration of young herring, are (1) low total quantity but high surface abundance of deep-water plankton forms in the tide rips of the centrally placed passages, where the fattest herring are found, and (2) residual currents seen from hydrographic considerations to go past or from the region, yet drift bottles penetrate it against the prevailing winds. The problem is seen to be a matter of precise behaviour of the herring and of its planktonic food, and of the precise character of the complicated water movements that shift these animals.—*A. G. Huntsman.*

3531. KÄNDLER, RUDOLF. Untersuchungen über das Laichen des Ostseesdorsches im Herbst. *Kieler Wiss. Meeresforsch.* 2(2): 272-292. 2 fig. 1938.—Although spring spawning habits of Baltic codfish are fairly well understood, a number of hauls with Hensen's eggnet in Bornholm and Danzig basins gave astonishingly high counts of codfish eggs in September 1937, indicating the presence of a fall spawning codfish. The highest egg counts per sq. m. were obtained in the inner half of the 80 m. contour depth. The high-point of the spawning season was reached about the middle of Sept. The eggs were all from *Onos cumbrinus*. The spawning fishes lay the eggs on the sea-bottom, whence they climb until they arrive at that stratification where the water density is comparable to their own. A comparative study of temps., salinities, and O₂ contents at various depths shows that this upward streaming brings the eggs and larvae into more favorable developmental conditions. It also shows a definite correlation with the spawning season, the adult fish apparently awaiting optimum conditions. The saline boundary of suspensibility in Bornholm was found to be somewhere between 13-14% instead of the usual 11%. This accounts for apparent egg concs. at certain depths as well as to indicate a possible racial difference. Spring spawners average between 52.5-52.6 vertebrae per fish, while fall spawners average between 52-52.1 vertebrae. All the data at hand indicate that there are 2 definite waves of migration to the spawning beds, and that the early and late spawning codfish are of 2 typical season races.—*W. M. Morton.*

3532. MENZIES, W. J. M. Some preliminary observations on the migrations of salmon (*Salmo salar*) on the coasts of Scotland. *Cons. Perm. Internat. Explor. Mer Rapp. et Procès-Verbaux Réunions* 108(3): 17-35. 4 pl., 11 fig. 1938.—Fishermen believe that salmon move in a definite direction along the Scottish coast. Evidence from indiscriminate capture in nets shows, however, that salmon move in a straight line along shore for only short distances and these journeys are interspersed between definite on- and off-shore movements perhaps to a distance of several miles. In 1913 and 1914, 1019 salmon were marked in the inner narrows of Moray Firth and 28% recaptured. The majority of these fish were not bound for the rivers at the head of the firth but for many of the Moray Firth rivers. They evinced a roughly circular movement around the narrow part of the firth waiting for water to reach their own river. In 1915, 1773 fish were marked in Moray Firth about

35 miles north of the first exp. and 23% were recaptured. A few longer migrations occurred but in general the results confirmed those of 1913-14. In 1920, 478 salmon were marked in Thurso Bay and 14% recaptured. These showed a much more restricted movement and indicated a local stock which had finished their migration and were awaiting opportunity to ascend one of the 3 neighboring rivers. In 1921, 100 fish were marked 45 miles west of Thurso and 9 recaptured. These experienced extensive movements both east and west. In 1936, 1255 salmon were marked at Loch Inchard and 12% recaptured. The movements of these fish were widely dispersed, one being recaptured in Norway and one on the Yorkshire coast in northeast England. Many of the fish were retaken near to or within rivers. For such salmon, the parr areas of their scales were similar to the parr area of fish known to be native to the stream where the salmon were retaken. This homing instinct was further demonstrated by the scales of 3 salmon marked in Norway and recaptured in Scotland; one showed characteristic parr marks of the Forth and one of the Tweed. In 1937, 448 fish were marked 20 mi. south of Loch Inchard and 13% recaptured. The results practically duplicated those of the previous year. The facts at hand leave no doubt that salmon taken in the commercial fisheries along the coasts of Scotland are on their way from feeding grounds to fresh water. Because of scarcity of salmon taken in the intensive fisheries of the North Sea, this area may be excluded as a salmon feeding ground. Present indications are that the salmon return from feeding grounds along a route to the north or northwest of the British Isles.—*F. N. Clark.*

3533. TÅNING, Å. VEDEL. Migrations of small Halibut marked in Faroese waters. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 13(3): 370-375. 1 fig. 1938.—A preliminary report of results of marking exps. on small Halibut (*Hippoglossus vulgaris*) in the Faroe Area, where such exps. have not been carried out previously. About 70 specimens ranging from 33 to 62 cm. in length were tagged and liberated in fjords of the Faroes during July and Aug. 1937. During 14 months 18 (26%) were recaptured and of the recaptured individuals 5 specimens had left the area and had migrated to Iceland (4 specimens) and to the central North Sea (1 specimen). Whether the migration is caused by inception of maturity or some other stimuli is not certain, as the size at the beginning of maturity is not known with certainty in this area, the spawning places being situated west of the Faroes in the great bight of the North-Atlantic off Scotland-Faroe-Iceland.—*Å. V. Tåning.*

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 3414, 4678, 4681, 4760, 5096, 5220)

3534. BRADT, GLENN W. A study of beaver colonies in Michigan. *Jour. Mammal.* 19(2): 139-162. 1938.—Methods of live trapping, branding, and determining sex of beavers were developed. The number of beavers per colony is 1 to 12; the average, for the 57 colonies studied intensively, was 5.1. The number of beavers per lodge is not a satisfactory unit for use in estimating beaver populations over extended areas. The number and size of beaver dams afford little indication of the number of beavers present. The "typical" beaver colony consists of a family, including the 2 parents, the yearlings born the previous year, and the kits of the current year. Every member of the colony aids in maintaining the colonial dams. The average number of beavers born per litter is between 3 and 4. There is 1 litter per year. The sexes are approx. equal in number in the beaver, the number of ♂♂ slightly exceeding the number of ♀♀. The beavers studied cut between 200 and 300 trees each per year. One acre of poplar (aspen) should support an average beaver colony from 1 to 2.5 years. Yearlings are permitted to remain in the colony, but the 2-year-old beavers leave or are driven from the home colony shortly before the birth of the 2d annual litter. In migrating, beavers may undertake long overland journeys. The emigration of the 2-year-old beavers provides a method of dispersal, and tends to establish new colonies in areas not previously stocked with beaver. The size and composition of beaver colonies is such as to permit the efficient and

economical use of food supplies adjacent to small bodies of water.—*Auth. summ.*

3535. DARLING, F. FRASER. A herd of red deer; a study in animal behavior. x+215p. 4 maps, 7 pl., 10 fig. Oxford University Press: London, 1937. Pr. \$5.50.—This book recounts in simple plan the results of a 2-year study of the red deer of an area in N.W. Scotland. It contributes greatly to the understanding of the largest game animal of Great Britain. The red deer is a species closely related to the American wapiti, and in this part of Scotland at least it may be considered as having throughout several hundred years attained an ecological balance in respect to man such as today is hardly to be encountered among the wapiti of America, harassed as they are by the curtailment of either winter or summer range, or both, and by political considerations and demands of sportsmen. Of particular value are the data upon the reactions of the deer to sudden changes in temp., humidity, and other environmental conditions—data that may, with profit, be used as yard-sticks in the study of the deer of other areas throughout the world. Technique and equipment are usefully described—the author found he could do stalking best when barefoot—the whole threshold of awareness was raised. Territory and population are treated under the divisions of winter, summer, and breeding territories; deer paths, wallows, and rubbing trees, and the social groups of hinds, stags, and harem. The social organization is matriarchal; hinds, not stags, are the leaders of family groups, of which the stags are only temporary members. Voice and play are described and general sociality discussed and to some extent compared with that of the roe deer and feral goats and sheep. There are chapters on movement as influenced by meteorological factors, insects, and food supply. Reproduction is treated in detail and the senses are discussed and appraised. Theoretical considerations receive attention throughout. There is a glossary of Gaelic place names, a succinctly annotated bibliography extending over 5½ pages, and a good index.—*Courtesy Jour. Mammal. and Wildlife Review.*

3536. ERRINGTON, P. L., and M. McDONALD. Conclusions as to the food habits of the barred owl in Iowa. *Iowa Bird Life* 7(4): 47-49. 1937.—Nestling young of the Iowa barred owl (*Strix varia*) seem to be fed the same sort of food that is eaten by the adult owls, except for very small prey, such as insects, which the adults apparently eat upon capture and rarely carry to the nest. Virtually any animal living in the owl's habitat, from insects to the largest vertebrates within its power to kill, may fall victim, observations in Iowa and Wisconsin showing such items of interest as the kingfisher (*Megasceryle alcyon*), bat (*Myotis grisescens*), and small mink (*Mustela vison*). Of the prey species occurring in the barred owl's diet, only the bobwhite (*Colinus virginianus*) has been thoroughly studied from the standpoint of population on the same areas where the barred owl work was done. Excess bobwhites are usually eliminated by the far more formidable horned owl or the Cooper's hawk (*Accipiter cooperi*), but, in the event of scarcity or absence of these owls and hawks, a compensating elimination seems to take place through the medium of weaker or clumsier predators, the barred owl included.—*Courtesy Exp. Sta. Rec.*

3537. McATEE, W. L. Wildfowl food plants. Their value, propagation, and management. ix+141p. 17 pl., 4 fig. Collegiate Press, Inc.: Ames, Iowa, 1939. Pr. \$1.50.—This book discusses briefly the productivity, food value, and utilization by wild fowl of aquatic plants. The longest chapter treats important food plants by families, giving notes on their variety, recognition, ecology, and use by waterfowl. Chapters are devoted to environmental limitations on the growth of aquatic plants, as illumination, fertility, quality of water, and pollution; to planting suggestions including storing and handling, together with recommendations of plants for particular environments; to construction of ponds for various sites and preparation of planting areas; and to control of undesirable plants and animals. There is also a glossary of vernacular names of wild fowl food plants, a bibliography of 37 titles, and a 15-page index.—*W. L. McAtee.*

3538. MOFFITT, JAMES. Eighth annual black brant census in California. *California Fish and Game* 24(4): 341-346. 1938.—In point of total numbers, the 1938 census of black brant in California was about average for the 8 seasons in which counts were made. Humboldt, our most important brant bay, had more than usual numbers present at census taking time and a tremendous conc. a month later. Here, the 1938 figures exactly doubled the previous year's, one of light visitation. The aggregate total for Bodega, Tomales, and Drake's bays was somewhat under the 1932-1936 average for the region, but an incomplete census was probably obtained at Tomales Bay this year and the deficiency might make up the difference. The Morro Bay 1938 result was close to counts obtained the previous 2 seasons, but twice as many birds were reported present 2 weeks before census taking. While somewhat lower than in 1937, the Mission—San Diego Bay aggregate of 722 brant indicated that numbers of the birds have become re-established there after years of absence.—*J. Moffitt.*

3539. NELSON, A. L., TALBOTT E. CLARKE, and W. W. BAILEY. Early winter food of ruffed grouse on the George Washington National Forest. *U. S. Dept. Agric. Circ.* 504. 1-37. 28 fig. 1938.—A preliminary economic study by the Bureau of Biol. Survey to provide a scientific basis for forest-game management on the George Washington National Forest, Virginia and West Virginia, disclosed that 20 plants are outstanding sources of food for ruffed grouse in early winter. These plants furnished about 85% of the contents of 185 stomachs collected, chiefly by hunters, in Nov. and Dec. 1935 and 1936. Herbaceous plants supplied about $\frac{3}{4}$ of the food, shrubs and vines each about $\frac{1}{4}$, and trees the remainder. The habitats of the 20 plants also were studied. The results, shown in tables and graphs, indicate that wooded areas with open canopies and with soils sufficiently productive for the growth of mixed stands of shrubs and vine thickets furnish the best feeding grounds. The early winter food plants, which are probably equally useful to grouse throughout the winter, are illustrated in normal winter condition for purposes of identification, as their winter appearance may be quite different from their showy summer appearance. This will be of help in setting

up C. C. C. projects for improving grouse habitats in this and adjacent forests.—*A. L. Nelson.*

3540. PALMER, RALPH S. Late records of caribou in Maine. *Jour. Mammal.* 19(1): 37-43. 1938.—A summary of most of the literature, and a questionnaire circulated to game wardens, revealed that the Woodland Caribou (*Rangifer caribou caribou*) probably was extirpated in Maine not later than 1910 as a result of occupation of the land in conjunction with lumbering, extensive forest fires, and overshooting. Restocking with this species would probably be inadvisable.—*R. S. Palmer.*

3541. TRAVIS, BERNARD V. The fire ant (*Solenopsis* spp.) as a pest of quail. *Jour. Econ. Ent.* 31(6): 649-652. 1938.—Fire ants are destructive to quail; they enter the pipped egg and consume the chick before it can escape from the shell. As many as 15% of the quail nests were destroyed even when the nearby colonies of ants were fumigated with NaCN. NaCN (1 ounce to 1 gallon of water) and dry NaCN (1 oz. to each colony) have been used as control measures. The respective percentages for inactive colonies 3 months after the treatments were 66 and 53. Repeated applications of the cyanide soln. not only failed to eradicate ants, but appeared to more than double the number of colonies present in a given area. There was, however, a large numerical reduction of the ants. 58% of the colonies from which queens were removed remained active and continued to produce young. One colony migrated 117½ feet, 105½ of which was subterranean. Exps. in cages were made difficult by the ability of the ants to cut their way out of ordinary formicaries. Poisoned baits have not shown much promise as a method of control.—*B. V. Travis.*

3542. WILCOX, A. N., et al. The search for natural history areas in Minnesota. Report of the Committee on the Preservation of Natural Conditions. *Proc. Minnesota Acad. Sci.* 6: 20-25. 1938(1939).—The Committee has located several areas preserved in approx. their primeval condition. Plans are under way to preserve a 1300-acre tract of virgin hardwood timber in Rice County, Minnesota. Other smaller areas of natural interest are to be preserved according to plans of the Committee.—*H. K. Wilson.*

BIOLOGICAL ABSTRACTS

Editor-in-Chief, JOHN E. FLYNN; Assistant Editor, JEAN MACCREIGHT

VOLUME 13

APRIL, 1939
Entries 5255-7059

NUMBER 4

GENERAL BIOLOGY

Editors: A. H. GRAVES, *Plant*; C. A. KOFOID, *Animal*

(See also in this issue Entries 5275, 5365, 6066, 6117, 6210, 6332, 6952)

PHILOSOPHY OF BIOLOGY

5255. AGAR, W. E. The concept of purpose in biology. *Quart. Rev. Biol.* 13(3): 255-273. 1938.—The author starts "with the assumption that it is reasonable to suppose that the acts of living organisms are directed towards ends" and discusses "how far this is consonant with observation; what are the ends to which the acts are directed; what are the agents which are acting thus; and finally suggests a theory of causation which includes purpose as a causally efficacious factor."—H. G. Swann.

5256. PRENANT, MARCEL. Biology and Marxism. Transl. by C. DESMOND GREAVES. With a foreword by Joseph Needham. xxiii+223p. 5 fig. International Publishers: New York, 1938. Pr. \$2.50.—The point of view of this book is that the dialectical materialism of Marx and Engels is of cardinal importance for the understanding of biological problems. Marxism is held to be the quintessence of the scientific method and is helpful to the biologist by pointing the way towards the kinds of hypotheses profitable for him to form and indicating questions which are meaningless or unanswerable. It discusses the problems of evolution and modern biology in relation to those of politics and society and emphasizes the distinctions existing between the biological and societal categories of organization as conceived in dialectical materialism. The chapter on evolution and dialectics contains a criticism of Vialleton's *L'origine des êtres vivants et l'illusion transformiste* as reactionary, stresses the increase in structural complexity in the evolution of groups found in the fossil record, and discusses the inevitability of gaps in the evolutionary series of descent. The chapter on evolution and materialism traces the origin of man and emphasizes the relatively recent emergence of thought. Other chapters trace the evolution of society, class distinctions, and recent developments in utilizations of natural resources in the U. S. S. R. The dialectic method of Marx is applied to basic biological and philosophical concepts of matter and movement, the logic of contradictions, cause and effect, nature of living matter, quantity and quality, chance, crises, continuity, and the limitations of mechanical materialism. The more explicitly biological factors of competition and population, adaptation, the structure of living matter, the problem of form, heredity, factors in evolution, and consciousness receive full discussion. The claim is supported that sociology is more than human biology. The use of biology to support racialism and to define the class struggle adequately is criticized. Empirical, experimental biology is akin to dialectic materialism and opposed alike to teleological vitalism and agnosticism. The closing chapter contains citations from Marxist writers on biological subjects. A full bibliography and glossary are added.—C. A. Kofoid.

MICROSCOPY, INSTRUMENTS, TECHNIQUE

5257. BARNARD, J. E. A microscopist looks forward. *Brit. Med. Jour.* 1939(4073): 183-184. 1939.—The author, well known for his work on the ultramicroscopy of viruses, delivered his 5th presidential address before The Royal Microsc. Soc. He explained briefly the technic of mounting sections in castor oil on quartz slides to render tissues sufficiently transparent in the u.-v. to permit photography

of the virus. The band in the electro-magnetic wave range which photomicrography has succeeded in using is from 4,000 to 2,000 Å. It is hoped the improved technic will enable the microscopist to utilize the range from 2000 to 500 Å. A new quartz objective is expected to further improve microphotography. The introduction of u.-v. microscopy has more than doubled the scope of the microscope and has opened new fields of investigation.—J. B. Paton.

5258. DAVENPORT, H. A., JANET McARTHUR, and S. R. BRUESCH. Staining paraffin sections with protargol. 3. The optimum pH for reduction. 4. A two-hour staining method. *Stain Technol.* 14(1): 21-26. 1939.—Further work on conditions affecting the reduction of paraffin sections impregnated with protargol showed that the opt. pH for sulfite-amidol mixtures was between 6.5 and 7.5. A staining method which requires about 2 hours to complete consists of the following steps: (1) One hour impregnation at 60° C in 10% AgNO₃. (2) Wash in distilled water 3 changes of 30 sec. each. (3) Put into protargol (Winthrop Chem. Co., New York, N. Y.) 0.2% aq. for another hour at room temp. (4) Rinse 2 sec. (5) Reduce 1-2 min. in amidol 0.2 g., Na₂SO₃ 8 g., NaHSO₃ 1 g., and water 100 cc. (6) Wash thoroughly. (7) Tone with 0.1% gold chloride. (8) Wash. (9) Reduce with a 0.5% aq. soln. of amidol (no sulfite). (10) Wash, dehydrate and cover. The method stains neurofibrillae and unmyelinated fibers and has worked well on most tissues of vertebrates. The stain follows acid alcoholic fixation.—Auth. abst.

5259. GOWER, W. CARL. A modified stain and procedure for trematodes. *Stain Technol.* 14(1): 31-32. 1939.—"To 100 cc. of 45% glacial acetic acid add 10 g. of carmine; dissolve by heating and allow to come to a boil; cool and filter; remove the filter paper from the funnel and spread it out flat to dry. The filtrate is Schneider's aceto-carmine and may be saved for the uses indicated for this stain. When the residue left on the filter paper is dry, remove it as carefully as possible. It may be used at once or placed in a tightly closed container for future use. The staining soln. is made up the same as Mayer's carmalum, substituting the acidified carmine descr. above for carminic acid. Acidified carmine 1 g., alum 10 g., distilled water 200 cc. The ingredients are mixed and dissolved with heat; when completely dissolved and cooled, filter the mixture and add a crystal of thymol to prevent mold growth. If correctly used this stain gives a deep rose red color to the principal organs of trematodes. It is purely a nuclear stain, and consequently there is no diffuse stain in the cytoplasm, making the organs stand out in the practically transparent body."

5260. KAZEIEFF, W. N. Moving photomicrography. *Ann. Rept. Smithsonian Inst.* 1937: 323-338. 12 pl. 1937(1938).—The equipment of Comandon and De Fonbrune is described. Single exposures from motion pictures illustrate how they are using the equipment for the analysis of excystment and division of amoeba, division of trypanosomes, karyokinesis of rabbit red blood cells, phagocytosis, humoral defence, bacteriophage and antitoxin and cryptotoxin effects. The modified Debie camera can take up to 250 frames per sec.—O. W. Richards.

5261. LEVINE, NORMAN D. The dehydration of methylene blue stained material without loss of dye. *Stain*

Technol. 14(1): 29-30. 1939.—A procedure for dehydrating methylene blue stained protozoan smears, which should be applicable to the dehydration of tissues stained intra vitam with methylene blue: Wash with distilled water, place in tertiary butyl alcohol for 1-2 min., then in 3 or more changes of tertiary butyl alcohol for 15 min. to an hour each, and mount directly in balsam or pass through 2 changes of xylene before mounting.—*Auth. abst.*

5262. MARVIN, JAMES W., and EDWIN B. MATZKE. A new method for the construction of three-dimensional cell models. *Amer. Jour. Bot.* 26(2): 101-103. 3 fig. 1939.—A new technique is described for modeling cells in 3 dimensions, to be used in studying their shapes. The cells are impregnated with hard wax, the casts are separated, each face is drawn with a camera lucida on bristol board, and the pieces of bristol board are then fitted together in proper order to build a scale model of the cell, much enlarged.—*J. W. Marvin.*

5263. MORITZ, C. E. Modifications of Lebowich's soap-wax technic. *Stain Technol.* 14(1): 17-20. 1939.—Lebowich's technic is outlined for simultaneous dehydration and infiltration of tissues by a medium composed of stearic acid, 56° C paraffin, diethylene glycol, and monoethanolamine. The prices and places where these materials may be purchased are given. Tissue for sectioning is placed in acetone, C.P., for 1 hour, then put directly into the soap-wax medium at 60° C under reduced pressure, and finally embedded in new soap-wax. Modifications include a simplification of the apparatus used by Lebowich. A preserving jar fitted with a rubber stopper serves as a vacuum chamber, and use of an aspirator accomplishes the reduction of pressure. With invertebrate embryos up to 1000 μ diam. no reduction of pressure is needed. Embryos are fixed, washed, placed in acetone, infiltrated in soap-wax, and embedded. By this soap-wax method the alcohols, xylene, and overnight drying of affixed ribbons are eliminated. Tissue may be fixed, sectioned, stained, and permanently mounted within 6-8 hours.—*Auth. abst.*

5264. SOLBERG, ARCHIE NORMAN. The preparation of plaster of Paris embedding boxes. *Stain Technol.* 14(1): 27-28. 2 fig. 1939.

5265. WHITAKER, THOMAS W. The use of the Feulgen technic with certain plant materials. *Stain Technol.* 14(1): 13-16. 2 fig. 1939.—The Feulgen technic as modified by Heitz promises to become an extremely useful tool in the solution of certain cytological problems. A procedure is outlined for using this technic with root tip smears, and smears of plant microspores. The chief improvement suggested over previous methods is that the material be mounted in euparal, after immersion in 95% alcohol. The technic is of value in the study of chromosome fragmentation, chromatid coiling, centromeres, etc., in both somatic tissue and in microspores.—*Auth. abst.*

TAXONOMY AND NOMENCLATURE

5266. CLAUSEN, JENS, DAVID D. KECK, and WILLIAM M. HIESEY. The concept of species based on experiment. *Amer. Jour. Bot.* 26(2): 103-106. 1939.—In forming species concepts, due emphasis has not been accorded the fact that in truly interspecific hybridizations only small percentages of the genic recombinations survive and that vigor of the survivors is reduced, making the 2d generation of such hybrids unfit for natural competition. These conclusions are based on combined morphologic, geographic, ecologic, cyto-genetic and transplant investigations on groups of Western American plants. These include *Zauschneria*, *Potentilla*, *Viola*, and especially the *Madiinae*, with 70 spp. in 6 genera used in 200 successful hybrid combinations. From these exptl. data and recent literature on interspecific hybridizations it is concluded that plants are organized into more or less discontinuous groups, the members of each of which are able to interchange their genes freely in all proportions without detriment to the offspring. These groups are separated by internal barriers of a physiologic-genetic nature (including chromosomal barriers) that prevent free interchange of genes. Such naturally incompatible groups correspond fairly closely to the species of most taxonomists. This criterion for species is the same that Turesson used for his ecospecies. His terms are employed for groups whose status has been experimentally determined. This classifica-

tion is based on the 2 kinds of barriers separating natural units, the internal (hereditary) and external (environmental), and on the degree of the internal separation. Criteria are given for these units, the biotype, ecotype, ecospecies and cenospecies, and their morphologic homologues, local variation, subspecies, species and species-complex. Cenospecies and ecospecies are separated by internal barriers; ecotypes are separated only by external barriers; local variations have no barriers between them. The genetic barriers between cenospecies are absolute; those between ecospecies of one cenospecies are partial, but are augmented by external barriers. Different cenospecies may occur together, but ecospecies and ecotypes of one cenospecies occupy a series of different environments. The ecospecies is the basic taxonomic unit in exptl. work. The internal barriers between them are often produced by differences in the number of chromosomes. Both ecospecies and ecotypes usually differ by many genes. Taxonomic classification based on expt. stops with the ecotype. Morphologic characters used in classification are often closely correlated to the physiologic-hereditary complexes on which ecotypes are based, such as earliness and capacity for survival in certain environments. Nomenclatorially, each ecospecies of a cenospecies and also monotypic cenospecies become taxonomic spp. Whenever exptl. evidence is lacking, the terms ecotype, ecospecies and cenospecies should never be used but their homologues subspecies, species and species-complex.—*J. Clausen.*

5267. COPELAND, HERBERT F. The kingdoms of organisms. *Quart. Rev. Biol.* 13(4): 383-420. 1938.—It is suggested that all organisms should be classified into 4 kingdoms rather than the conventional 2, particularly since the latter division—into plants and animals—has become increasingly troublesome. The 4 suggested kingdoms are: Monera, organisms without nuclei, with cells solitary or physiologically independent; Protista, organisms largely unicellular, with nuclei; Plantae; and Animalia. In proposing this division into 4 kingdoms, evolutionary, morphological and physiological criteria are used. The author discusses the first 2 kingdoms in detail.—*H. G. Swann.*

5268. EPLING, CARL. Scylla, Charybdis and Darwin. *Amer. Nat.* 72(743): 547-561. 2 fig. 1938.—Sub-specific and supra-specific differences in several genera of the Labiatae, particularly *Hyptis* and *Salvia*, are examined in the light of Anderson's suggestion that changes in emphasis separate species while categories of higher rank (genera, sub-genera) may be separated by differences in pattern. The evidence from these genera does not bear out the suggestion. Changes of emphasis and differentiation both occur but it is very difficult to distinguish between them and both may characterize specific as well as supra-specific differences. Species groups (sub-genera) are rather to be defined by different combinations of changes of emphasis. The author then discusses the genus from the standpoint of (1) its use as a subjective convenience for the cataloger and (2) its existence as an evolutionary reality. He concludes that in the latter sense it may indeed be true that differences of pattern are of generic significance.—*E. Anderson.*

TEXTS AND EDUCATION

5269. BEAVER, WILLIAM C. Fundamentals of biology. Animal and plant. 896p. 299 illus. C. V. Mosby Co.: St. Louis, Missouri, 1939.—The author presents in almost encyclopedic form the fundamentals of Animal and Plant life. Combining both the "Principles" and the "Type" methods of presentation, the text uses the unusual device of comparative study of the materials by systems, and not by organisms. Introduction of this well-proven device taken from advanced courses promises a new point of view for the beginning student. The economic phase and human applications are also stressed throughout the book. The book is composed of 5 major divisions: (1) Laws and Principles, Tissues and Organs; (2) Survey of past and present Animal Groups; (3) Survey of the Plant Groups; (4) Special topics such as Heredity, Variation, Origin and Propagation of Life, Bio-chemical and Biophysical Phenomena, Photosynthesis, and Applied Biology; (5) an Appendix containing a glossary, a summary of methods, a list of Biological Derivatives, a list of useful reference books for Botany and Zoology and a key for the identification of

common insects. The book is well printed on green "eyetoned" paper and shows remarkably few typographical errors. The numerous illustrations are usually clear-cut in demonstrating their desired details, but are not as finished in appearance as is customary in textbooks. It is a relief to note the omission of many of the old classical figures that have perpetuated early mistakes for too many generations.—A. C. Walton.

5270. HAUPT, ARTHUR W. An introduction to botany. xii+396p. McGraw-Hill Book Co.: New York, 1938. Pr. \$3.—The book is designed as a text for one semester of elementary botany or for the first half of a biology course. The organization is rather unique, permitting the instructor to interest his class in the first lessons with discussions of plants as they have been observed by the student in the field. Sections concerned with root types, leaf arrangements, buds, stem types, and leaf types are followed by one on vegetative reproduction. The author then proceeds with a more critical examination of cells and vegetative tissues. The more important physiological relationships and processes are discussed. Considerable attention is given to the subjects of flower parts and seed classification. Chapters on floral evolution, pollination, seeds and seedlings are followed by one dealing with heredity and plant breeding. The last half of the book is reserved for a survey of the plant kingdom, a discussion of characteristics of the chief families of Angiosperms, and fossil plants. Evolution, heredity and adaptation have received special consideration. Plant examples have been taken from among those most familiar to the student. Throughout the book the author assigns functions to the organs and tissues. Purposeful explanations are frequently

given. Morphology assumes the limelight while very little attention is paid to the physiological status of the plant with regard to structure, distribution, or the expression of hereditary potentialities.—R. A. Popham (courtesy of *Ohio Jour. Sci.*).

MISCELLANEOUS

5271. CASTETTER, E. F., W. H. BELL, and A. R. GROVE. Ethnobiological studies in the American southwest. VI. The early utilization and the distribution of agave in the American southwest. *Univ. New Mexico Bull. Biol. Ser.* 5(4): 1-92. 4 fig. 1938.—Agave was aboriginally one of the most important plants utilized by southwestern Indians, and was employed for food, alcoholic and non-alcoholic beverages, fiber, nets, bags, basketry, mats, blankets, braids, hair and paint brushes, needle and thread, armor, lances, fire hearths, paint, soap, medicine, and ceremonial objects. Of these food was most important, and pit-baking of agave crowns was very widespread in the area. The preparation of the plant for food and beverage is described in detail. There is an exhaustive discussion of the early utilization of agave by the several tribes in the southwestern area. Three maps show in detail the distribution of agave spp. in the Southwest, and a fourth map shows the distribution of mesquite finds, mesquite midden circles, and mesquite pits in this area. The early history of agave in the New World is presented, and a bibliography of 150 titles adds to the value of the paper.—E. F. Castetter.

5272. MURPHY, R. E., and M. MURPHY. Pennsylvania. A regional geography. 591p. illus. Pennsylvania book service; Harrisburg. 1937.

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 5282, 6525)

HISTORY

5273. HEDLEY, O. F. Contributions of Edward Jenner to modern concepts of heart disease. *Amer. Jour. Public Health* 28(10): 1165-1169. 1938.—Jenner's first postmortem on a case of angina pectoris was performed about 1772; he stated that the coronary arteries "were become bony canals." In another case "the coats of the arteries were hard and a sort of cartilaginous canal was formed within the cavity of each artery." Jenner ascribed the disease to the changes in the coronary arteries but did not pursue his studies because he feared the effect on his friend John Hunter who suffered from this malady. About 1778, Jenner with other friends formed a small society "to promote medical science, conviviality and good fellowship." To this society he presented a paper on angina pectoris; this paper later formed the basis of a book by Parry on the subject. Jenner was also among the first to note the relationship between rheumatic fever and heart disease, records of the society indicating that he presented a paper on this subject illustrated by dissections on July 29, 1789. Unfortunately neither of these papers was published at the time, and we have only statements of others and letters to support the claim for Jenner's priority.—P. F. Clark.

5274. MITCHELL, G. A. G. Early medical history of Aberdeen. *Brit. Med. Jour.* 1939(4076): 336-338. 1939.—Because the 107th annual meeting of the British Medical

Association will be held at Aberdeen in July 1939, the Journal is publishing a series of descriptive and historical articles on its medical institutions. This article deals with ancient hospitals (1211-1632), early medical practice and practitioners, famine and disease (including the plague epidemics of 1401 and 1498) and early medicine at the university. The descriptions, quotations from early records, curious incidents and special historical dates are valuable contributions to the history of medicine and public health. One notes the leper hospital before 1226, the introduction of syphilis about 1496 and an Aberdeen council regulation for the control of the disease, April 21, 1497, which is the earliest of the kind in Britain, and the first use in the district of Jenner's vaccine by a Rev. A. J. Forsyth. As early as 1593 the principal of Mareschal College was expected to teach physiology (according to Aristotle) and give a short explanation of anatomy.—J. B. Paton.

5275. TRUE, R. H. The Michaux memorial grove. *Morris Arboretum Univ. Pennsylvania Arboretum Bull. Associates* 2(12): 48-49. 1938.—In Fairmont Park, Philadelphia, established in 1876.

BIOGRAPHY

5276. STARKEY, ROBERT L. Giacomo Rossi, 1872-1938. *Soil Sci.* 47(3): 173-174. Portrait. 1939.—Italian bacteriologist, known chiefly for his work on soil bacteriology.

BIBLIOGRAPHY

MRS. EILEEN R. CUNNINGHAM, *Editor*

5277. FISHERIES RESEARCH BOARD OF CANADA BULLETIN. Under the control of The Hon. The Minister of Fisheries. 56: 1939. Formerly: Biological Board of Canada Bulletin.

5278. NICKLES, J. M., M. SIEGRIST, and E. TATGE. Bibliography and index of geology exclusive of North America. 1935-36. v. 3-4. Geological society of America; Baltimore, 1936-37.

5279. PEARL, RAYMOND, and MAUD DEWITT PEARL.

The prices of biological books in 1938. *Quart. Rev. Biol.* 13(4): 491-493. 1938.—A comparison is made of the cost per page of books from various countries.—H. G. Swann.

5280. PSYCHIATRY. Journal of the Biology and Pathology of Interpersonal Relations. Vol. 1, no. 1, February, 1938. E. E. HADLEY, Secretary of Publications Committee. Quarterly. Publ. by the William Alanson White Psychiatric Foundation, Washington, D. C. Pr. \$6. per volume.

EVOLUTION

(See also in this issue Entries 5266, 5268, 5320, 5335, 5337, 5343)

5281. KRUMBIEGEL, INGO. Physiologisches Verhalten als Ausdruck der Phylogenese. *Zool. Anz.* 123(10/12): 225-240. 1 fig. 1938.—Phylogeny has hitherto been based almost exclusively on comparative morphology but comparative behavior and physiology may yield results of phylogenetic value. Starting from the observation that flightless ground beetles (*Carabus granulatus*) showed behavior reminiscent of flight, a study was made of flying and flightless birds. The tail reflex (elevating tail when forebody dips and vice versa) is well exhibited by flying birds and is also shown by flightless birds such as the ostrich and emu, an indication that the latter derive from flying ancestors. After studying abdominal and antennal responses in flying beetles and butterflies to changes of body position, flightless forms were tested and found to give similar reactions to tilting of the body in various ways. Several spp. of *Carabus* show much variation in the develop. of the wings from fully winged individuals to those with rudimentary wings; all give the same antennal reflex to body tipping. Primitive wingless insects as *Leptisma* completely fail to give any reflexes suggestive of flight. It is suggested that homosexual behavior may be a reminiscence of an original bisexual condition.—L. H. Hyman.

5282. SANDOW, ALEXANDER. Social factors in the

origin of Darwinism. *Quart. Rev. Biol.* 13(3): 315-326. 1938.—Darwinism, it is suggested, was in many ways an outgrowth of social conditions and much influenced by non-biological social factors. Its development was importantly conditioned by the Crusades, the conquest of the New World, the growth of mining, the business of practical breeding and the complex Malthusian social background. All of these have a common element: they were all basically economic and all represent various phases of one broad historical movement—the evolution of feudal into capitalist society. It was part of Darwin's genius that he found "pabulum for development not only in the purely biological, but also in the basic social phenomena of his age."—H. G. Swann.

5283. SZYMKIEWICZ, DEZYDERY. Quatrième contribution statistique à la géographie floristique. [In French.] *Acta Soc. Bot. Polon.* 15(1): 15-22. 1938.—The oceanic islands with their numerous endemic species offer a precise means of study of the origin of species. The number of newly derived species is affected favorably by the relative age of the islands, by their proportionate area and by more favorable and varied growing conditions. In throwing light on this problem 3 archipelagos were considered: Canaries, Galapagos and Hawaii.—F. A. Gilbert.

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. McCLUNG, *Animal*

(See also in this issue Entries 5262, 5265, 5266, 5307, 5312, 5320, 5321, 5328, 5330, 5331, 5340, 5919, 5970, 6328, 6375, 6428, 6448, 6492, 6639, 6822, 6893, 6939)

GENERAL

5284. BHADURI, P. N. Root-tip smear technique and the differential staining of the nucleolus. *Jour. Roy. Microsc. Soc.* 58: 120-124. 1938.—The paper discusses the examination of smears of cellular contents for cytological or other purposes. Heitz's Nukleal-Quetschmethode relies advantageously upon the use of the Feulgen reaction as a selective stain; but the chrom-osmic fixation preceding it is criticized. A new way of studying root tip smears is found in the use of a differential nucleolus staining technic. During development of this method various observations were made: for each plant, the optimum concentration of acetic acid and formalin as fixatives should be determined experimentally; with most plants, acetic alcohol (1:3) is quite a satisfactory fixative for the Feulgen stain, but interferes with the nucleolar stain; duration of hydrolysis is a critical point to be determined beforehand. *Smear Technic:* Method I. Fix overnight in Navashin's or acetic alcohol (1:3). Wash, and transfer to stoppered tubes containing N HCl. Transfer tubes for definite lengths of time to water at 58-60° C. Wash with dist. water, and hold in de Tomasi's decolorized fuchsin (*Stain Techn.*, 11, 137-44, 1936) 30 min. to overnight. Smear each root tip in a drop of 45% acetic acid between slide and cover glass. After 5 min. loosen cover glass by immersing horizontally in acetic alcohol 1:1. Transfer for 5 min. to acetic alcohol 1:9; soak 10 min. in two changes of 95% alcohol; treat 1 hr. in sat. soln. of Na₂CO₃ in 80% alcohol. Rinse, and keep 10 min. in 70% alcohol. Stain 15 min. with light green (Semmens and Bhaduri, *Stain Techn.*, 14, 1, 1939). Differentiate under the microscope in following solution: sat. Na₂CO₃ in 80% alcohol, 10 cc.; 80% alcohol, 40 cc. Rinse in 70%, dehydrate in 95, 100% alcohol. Clear in xylene alcohol, xylene, and mount in neutral balsam. Method II. Hydrolyze material stored in 80% alcohol with: 95% alcohol and conc. HCl, 1:1. Bring gradually to water, and stain as above.—J. A. de Tomasi (courtesy *Stain Technol.*).

PLANT

5285. AFIFY, A. Chromosome form and behaviour in tetraploid *Aconitum*. *Jour. Genetics* 36(3): 373-394. 1938.—The cytology of 2 tetraploid spp. of *Aconitum*, *chinense* ($n=8$) and *napellus* ($n=8$), was investigated. Meiosis

in both species shows normal chiasma formation, with a high coefficient of terminalization. In *chinense* only bivalents (78% of cases) and bivalents and univalents (22% of cases) are observed at MI; in *napellus* 68% of the pollen mother cells exhibit bivalents only, 20% bivalents and univalents, and 12% 1-2 quadrivalents and 1-3 trivalents, in addition to bivalents and univalents. The 2 spp. are sterile. Afify concludes that both are allotetraploid rather than autotetraploid.—H. E. Warmke.

5286. COONEN, L. P. The chromosomes of *Ranunculus*. *Amer. Jour. Bot.* 26(1): 49-58. 34 fig. 1939.—*R. abortivus*, $2n=16$; *R. rhomboideus*, $n=8$, $2n=16$; *R. acris*, $2n=14$; *R. calandrinoides*, $2n=ca. 18$; *R. californicus*, $2n=28$; *R. sceleratus*, *R. monspessulanus*, *R. fascicularis*, *R. recurvatus*, and *R. septentrionalis*, $2n=32$. Somatic chromosome lengths were detd. in *R. rhomboideus*. Cytological and taxonomic divergences of *R. calandrinoides* may justify its removal from the genus. Only one species did not have chromosome satellites; they were largest in *R. sceleratus* where they were observed in most mitotic stages and found to differ in chromophilic qualities from both nucleolus and chromosome body, although they were usually contiguous with the former and attached to the latter. Satellite and seta variations were noted in some spp. A few tetraploid root tip cells were found in 2 species and a pair of fragments was seen in equatorial plates of one root of *R. monspessulanus*. Of the 95 forms of 85 spp. of the genus thus far studied 74.71% have the basic number 8; 24.14%, 7; and 1.15%, 6. Basic numbers 6 and 7 are probably derived from 8.—L. P. Coonen.

5287. GEITLER, L. Weitere cytogenetische Untersuchungen an natürlichen Populationen von *Paris quadrifolia*. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 75(2): 161-190. 1938.—The frequency and distribution of inversions, as estimated from the observance of bridge-fragment configurations at I anaphase, was studied in 2 populations of *Paris* from localities in the Austrian Alps, a few km. apart, one of them 500 m., the other 1100 m. above sea level. *Paris* normally goes through meiosis after snow and frost have gone; buds which are exposed to late frost and snow during meiosis show much elongated chromosomes at I metaphase and anaphase with the major spirals abnormal or absent. 1427 bridge fragment configurations were ob-

served, which could be localized in one of the 5 pairs of bivalents found in this tetraploid species. 43 inversions are represented, which are distributed over all of the chromosome arms. The configurations are mostly simple, but some examples of more than one chiasma within an inverted segment were found. Pollen sterility in this species is due partly to inversion configurations and partly to the frequent presence of univalents. In the megaspore meiotic divisions there is less irregularity, a lower chiasma frequency, and a high degree of seed setting. The inversions are believed to be of great age, and some may have arisen before the formation of the species.—G. L. Stebbins, Jr.

5288. KARASAWA, KOTARO. On the chromosomes of *Crocus balansae* and *C. candidus subflavus*. *Genetica* 21: 88-81. 1939.—*C. balansae* has 3 pairs of chromosomes, with a rare occurrence of univalents at metaphase. In *C. candidus subflavus* 3 pairs were also found with slight irregularities in meiosis.—E. W. Lindstrom.

5289. LINDEGREN, CARL C., and SIEGFRIED RUMANN. The chromosomes of *Neurospora crassa*. *Jour. Genetics* 36(3): 395-404. 2 pl., 33 fig. 1938.—*N. crassa*, has approx. 9 haploid chromosomes in the leptotene stage of the zygote nucleus. As many as 155 chromomeres per nucleus were counted at this stage. At late anaphase of the 3d division in the ascus 6 chromosomes are visible in each nucleus.—H. E. Warmke.

5290. PARTHASARATHY, N. Cytogenetical studies in *Oryzaceae* and *Phalarideae*. III. Cytological studies in *Phalarideae*. *Ann. Botany* 3(1): 43-76. 1 pl., 71 fig. 1939.—The chromosome numbers of 13 spp. in the genera *Anthoxanthum*, *Phalaris*, *Ehrharta* and *Microlaena* were detd. The last 2 genera should be returned to the *Oryzaceae* on the basis of the chromosome resemblance as well as the taxonomic characters. The evolution of the group is discussed on the basis of the distribution and chromosome changes from species to species. In *P. coerulescens* and *P. paradoxa* genotypic differences controlling the size of the chromosomes have arisen. Polyploid races and spp. have appeared in *P. tuberosa* and *P. arundinacea*, structural chromosome alterations leading to fragmentation in *P. lemmoui*, and fusions resulting in diminution of chromosome number in *P. canariensis* and *P. brachystachys*. In *A. odoratum* segmental interchange has occurred, coupled with autopolyploidy. Inversions have occurred in this species and in *P. brachystachys*. *Ehrharta* has small chromosomes like rice, and the same number ($2n=24$) in *E. erecta*. 4 chromosomes are attached to the nucleolus in prophase, confirming that it is, like rice, a secondary tetraploid. *E. calycina* and *E. longiflora* have $2n=48$. *M. stipoides* also has $2n=48$. The catenation in *Anthoxanthum* is studied, as well as various types of chiasmata and bridge formation. Special attention is also given to the relation between chromosomes and the nucleolus, and to the secondary pairing in *Ehrharta*.—R. R. Gates.

5291. PETO, F. H. Cytology of poplar species and natural hybrids. *Canadian Jour. Res. Sect. C. Bot. Sci.* 16(11): 445-455. 1 pl., 1 fig. 1938.—Complete analyses of pollen-mother-cell nuclei at 1st metaphase, percentage good pollen, pollen diam., and pollen-size distribution were detd. for *Populus grandidentata*, *P. tremuloides*, *P. eugenei*, *P. alba*, *P. canescens*, natural hybrids of *P. alba* × *P. grandidentata* and of *P. alba* × *P. tremuloides*. Both of the *P. alba* and 2 of the 4 *P. canescens* trees examined were triploids ($2n=57$); all other trees examined were diploids ($2n=38$). Meiotic observations on the natural hybrids indicated a high degree of homology between the chromosomes of *P. alba* and the native aspens (*P. grandidentata* and *P. tremuloides*), since 17 to 19 bivalents were usually found at 1st metaphase. In collections from 1 triploid *P. canescens* and 2 diploid *alba-grandidentata* hybrid trees, failure of a high proportion of the chromosomes to pair was attributed to genetic factors limiting pairing, rather than to non-homology. Pollen characters such as percentage good pollen, pollen diam., and pollen size distribution were, in most cases, not indicative of the chromosome number or pairing relations at 1st metaphase. Consequently, triploids could not be detected by pollen observations. In spite of the lack of correlation between 1st metaphase and pollen observations, abnormally large pollen grains were observed in collections from several of the trees, and these

were considered to contain the diploid or unreduced chromosome complement. The tendency for the poplars to produce unreduced pollen grains probably accounts for the number of triploid trees discovered in Canada and Sweden.—Auth. abst.

5292. PHILP, JAMES. Aberrant leaf width in polyploid oats. *Jour. Genetics* 36(3): 405-429. 1938.—Crosses between *Avena sativa gigantea* and *A. fatua* resulted in hybrids with 41 chromosomes, a deficiency of one of a pair of L chromosomes which carry genes for broad leaf. Inclusion of the odd L chromosome in the pollen or egg nucleus in about 6% of cases resulted in more 40-chromosome recessive narrow leaved progeny than 41-chromosome broad-leaved. The L chromosome was shown to be different in form and genetic properties from G and V chromosomes, but similar in meiotic behavior. Chromatid bridges at anaphase were interpreted as evidence of an inversion, in accord with the author's earlier suggestion that structural rearrangement in the G chromosome in hexaploid oats and wheat would account for the lack of crossing over between a group of genes in that chromosome in interspecific hybrids.—J. S. Potter.

5293. SKALIŃSKA, M. Cytogenetic studies in aneuploid types of *Aquilegia*. *Bull. Internat. Acad. Polonaise Sci. et Lettr. Cl. Sci. Math. et Nat. Sér. B: Sci. Nat.* (1) [Bot.] 1938(1/5): 33-58. 1 pl., 4 fig. 1938.—A hyperdiploid plant ($2n+2$) forms occasional diploid and hyperdiploid pollen grains (1) by formation of a restitution nucleus at metaphase I; (2) by fusion of the meiosis II spindles; (3) by fusion of 2 telophase II groups of chromosomes from parallel spindles. The assumption that these diploid and hyperdiploid pollen grains will be more successful than the numerous haploid grains when all are placed together on the stigma of a tetraploid plant is confirmed by the production of tetraploid and hypertetraploid hybrids in greater numbers than triploid hybrids. Zygotes from gametes with approx. the same number of chromosomes have the best chance of normal development.—R. H. Lindsay.

5294. WHITAKER, THOMAS W., and I. C. JAGGER. Cytogenetic observations in *Lactuca*. *Jour. Agric. Res.* 58(4): 297-306. 3 fig. 1939.—The following spp. of *Lactuca* were studied cytologically and reciprocal crosses among them attempted: *sativa*, *scariola*, *chondrillaeflora*, *perennis*, *tatarica*, *cretica*, *bourgaei*, *graminifolia*, and *canadensis*. Among the 8- and 9-chromosome species there were marked differences in the chromosome ideograms. The greatest degree of differentiation in chromosome morphology was observed in *L. sativa*. Percentage of normal pollen varied from 80 to 85 in some species to 90 to 95 in others. All except *L. perennis* were self-fertile. Fertile hybrids were obtained only between *L. sativa* × *L. scariola* and *L. canadensis* × *L. graminifolia*. No cytological irregularities were observed in the F_1 or F_2 . Irregularities during meiosis apparently reduced pollen fertility to 80-85% in *L. bourgaei*, an 8-chromosome species.—V. R. Boswell.

5295. WOLCOTT, G. B. Cytological studies on the Hepaticae. II. The nucleolus-chromosome in *Pallavicinia lyellii*. *Amer. Jour. Bot.* 26(1): 41-44. 19 fig. 1939.—The nucleolus arises in late telophase nuclei at the end of a particular chromosome designated the "n-chromosome." There is always a single nucleolus in each haploid nucleus. In each diploid nucleus there are 2 nucleoli or one fusion nucleolus. The n-chromosome is medianly constricted and is of medium length in respect to the other chromosomes of the haploid complement.—G. B. Wolcott.

ANIMAL

5296. CREIGHTON, MARGARET. Chromosome structure in *Amblystoma punctatum*. *Cytologia* 8(3/4): 497-504. 2 pl., 3 fig. 1938.—By studying epithelial cells of larval salamanders in smear preparations, a double twisted or zigzag thread was found in each chromosome matrix. Metaphase chromosomes show quadruple threads.—H. Hibbard.

5297. FUJII, SUKEICHI. Demonstration of crossing-over in the salivary gland chromosome. (A preliminary note.) *Jap. Jour. Genetics* 14(6): 287-288. 1938.—The New Orleans stock of *Drosophila virilis* has the 6th salivary gland chromosome which stains more faintly than the corresponding chromosome of other stocks, although it has

the same pattern as in the latter. From the back cross, New Orleans \times Gap glossy— $F_1 \times$ glossy, a recombination stock with the glossy character was obtained, and the salivary gland chromosomes were examined. The basal half of the 6th chromosome consists of deeply stained quarters; the distal half is made up of a deeply stained quarter and a faintly stained quarter.—*T. Komai*.

5298. METZ, C. W. Chromosome behavior, inheritance and sex determination in *Sciara*. *Amer. Nat.* 72(743): 485-520. 7 fig. 1938.—The paper is a general account and review of conditions in *Sciara* (lower Diptera). 14 spp. have been studied cytologically, 4 genetically. In all but 2, one type of chromosome is "limited" to the germ-line in both sexes, being eliminated from somatic nuclei during cleavage. Eggs transmit the regular haploid chromosome group, but each sperm transmits 2 sister X chromosomes. In production of a \varnothing one of the latter is eliminated from all nuclei during early embryonic development. In production of a σ one is eliminated from the germ-line and both from the soma. All fertilized eggs have essentially the same set of chromosomes; the type of elimination from the soma apparently determines the sex of the individual. In some species half the $\varnothing\varnothing$ are "female-producers" and half "male-producers," their nature being detd. by the sex chromosomes, XX σ -producer, XX' \varnothing -producer (X' is a modified X). Type of elimination is here largely predetermined by constitution of mother, but numerous "exceptional" individuals appear in some "unisexual" families. Oogenesis is of standard type. In spermatogenesis there is no synapsis; the 1st spermatocyte division is unipolar; maternal autosomes and X and "limited" chromosomes go to the pole and are transmitted; paternal autosomes and X move backward away from the pole and are eliminated. Thus the σ transmits only maternal chromosomes and genes—except perhaps for the "limited" chromosome. The

2d spermatocyte division is also aberrant. Features of special cytological interest are discussed.—*C. W. Metz*.

5299. REUTER, ENZIO. Die Meiose bei *Alydus calcaratus*. (Eine Erwiderung an W. Ahrens.) *Zool. Anz.* 123 (4): 81-90. 3 fig. 1938.—In spermatogenesis, the conjugants (autosomes) separate except at one end and thus open out to give the false impression of a metasyndesis. A split develops in each conjugant (tetratene stage) and each chromatid shows 4 segments. The x-chromosome also has a 4-segmented structure. The 1st maturation division is reductional, in that the conjugants united in apparent metasyndesis separate, while the x-chromosome divides equationally. A number of other cases of a syndesis that was originally side-by-side imitating an end-to-end syndesis are known. Ahrens' misunderstandings of the author's findings in *Alydus* are quoted and criticized.—*L. H. Hyman*.

5300. RUEBUSH, T. K. A comparative study of Turbellarian chromosomes. *Zool. Anz.* 122(11/12): 321-329. 4 fig. 1938.—Table of size and nos. of chromosomes including all known determinations in Turbellaria. The size varies inversely with the number. The chromosomes of the Microstomidae resemble those of the Catenulidae more than they do those of the Macrostomidae, so that the 1st and 3d families seem not as closely related as usually supposed. The members of 1 genus usually have the same chromosome number but exceptions occur in *Macrostomum*, *Paravortex*, *Mesostoma*, *Dendrocoelum*, and *Planaria* (*sensu lato*). In 11 spp. of *Dalyellia*, $2n=4$. The 2 genera *Polycystis* and *Acrorhynchus*, belonging to the same family, diverge widely as regards chromosome number. The rhabdocoele groups *Typhloplanoida* and *Kalyptorhynchia* appear closely related. The few *Allocoecola* for which data are available diverge considerably. Similarities in chromosome number occur between triclads and polyclads. The small size of the chromosomes of *Temnocephala* may indicate some affinity to the *Dalyelliidae*.—*L. H. Hyman*.

GENETICS

Editors: ORLAND E. WHITE, *Plant*; SEWALL WRIGHT, *Animal*

(See also in this issue Entries 5266, 5285, 5287, 5292, 5294, 5297, 5360, 5476, 5721, 5795, 5934, 5956, 5974, 5975, 5985, 6015, 6025, 6233, 6327, 6379, 6428, 6459, 6471, 6484, 6520, 6666, 6893, 6908, 6994, 7037)

GENERAL

5301. BARTLETT, M. S. Deviations from expected frequencies in the theory of inbreeding. *Jour. Genetics* 35 (1): 83-87. 1937.—Deviations from expected frequencies for the numbers of heterozygotes in inbreeding problems are considered, and in particular exact formulae for the variance in the case of self-fertilization are obtained under certain conditions. These results illustrate how the deviations from the expected numbers depend on the absolute rate of change of the heterozygotes.—*C. B. Davenport*.

5302. FISHER, R. A. The precision of the product formula for the estimation of linkage. *Ann. Eugenics* 9 (1): 50-54. 1939.—The sampling variance is calculated for linkage estimated by the product formula in cases in which the recessives for one factor show diminished viability. Such lower viability considerably decreases the amount of information, although, as a calculated example shows, it would often be unwise to diminish the number of exptl. animals bred with a view to maintaining cultural conditions in which the different viability is less obvious.—*R. A. Fisher*.

5303. MITTMANN, O. Vererbung durch ein Genpaar und Mitwirkung des Restgenotyps im statistischen Nachweis. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 75(2): 191-232. 1938.—A demonstration of the inheritance of characteristics with overlapping phenotypes can be made as follows. Pure lines having the lowest and the highest expression of the phenotype are obtained, and crossed and the frequency of segregation in F_1 and F_2 are detd. A statistical criterion is presented by which the hypothesis of monofactorial inheritance may be distinguished from that of multiple factors. Since the expected values of segregation increase with increasing strength of the influence of the remainder of the genotype on the action of a single gene pair, the basis of the method is a comparison

of observed and expected results. Means of determining the effectiveness of the method are discussed.—*G. L. Stebbins, Jr.*

5304. WALLACE, H. A. Corn breeding experience and its probable eventual effect on the technique of livestock breeding. 16p. Michigan State College; East Lansing, [1938].

5305. ZIMMER, K. G., and N. W. TIMOFEEFF-RESSOVSKY. Note on the biological effects of densely ionizing radiation. *Physical Rev.* 55(4): 411. 1 fig. 1939.—In contradistinction to the conclusions of Kingdom and Tanis, the authors point out that in biological reactions where a single ionization within a very small volume produces the desired effect (e.g., in gene mutations), sources which produce an ionization more or less uniformly distributed through the volume are more effective than those which produce the same amount of ionization in a few dense tracks. Experimentally, an X-ray dosage of 1000 r produces half again as many mutations as an equal dosage of neutrons, and this ratio is maintained in the range 200-2000 r.—*E. W. Pike*.

PLANT

5306. ANDERSSON-KOTTO, I. Note on segregation from an aneuploid *Scolopendrium vulgare* sporophyte. *Jour. Genetics* 36(2): 221-223. 1938.—In *S. vulgare* normal type is dominant to the aposporous so-called peculiar type. The gametophyte of peculiar C used as a \varnothing had 50 chromosomes, the wild *vulgare* type σ had 30, and the hybrid sporophyte 80. Subsequent breeding behavior of the hybrid indicates that mutation of the peculiar gene *a* to its normal allelomorph A occurred in the hybrid or in one of the egg cells of gametophyte C because it agrees with the expectation for an aneuploid with trisomic inheritance (*aAA*) and random pairing of chromosomes.—*W. J. Haney*.

5307. ANDERSSON-KOTTO, I., and A. E. GAIRDNER.

Note on the chromosome numbers obtained from crosses with the "peculiar" aposporous type of *Scolopendrium vulgare*. *Jour. Genetics* 36(3): 509-514. 1938.—From crosses between the peculiar type of *S. vulgare* and *vulgare* type the gametic chromosome numbers 15-30 are obtained, whereas the gametophytic chromosome number is 30. There is a larger proportion of ♀ gametes than ♂ gametes with the full chromosome number. The results indicate that successive generations, when each is outcrossed with *vulgare* type, give the same result. F_2 and F_3 from reciprocal crosses differ in respect of the ratio of sporophytes with less than full to those with full chromosome number. The proportion of the latter on selfing from reciprocal crosses is higher in F_2 than F_3 . A process at the sexual stage apparently has the same effect as a reduction; or at least, chromosomes are eliminated at this stage. Further, selection of embryos or gametes occurs or a difference in compatibility exists for which the plasma is responsible.—*Auth. summ.*

5308. ARCENEUX, T. J., and F. D. COCHRAN. Mutations for flower color in *Camellia japonica*. *Proc. Louisiana Acad. Sci.* 4: 164-170. 1938.—A survey of 1072 *C. japonica* plants shows that the % of mutation color is very high. It is postulated that flower color is detd. by a primary gene (*A*) showing incomplete dominance; that the various shades of color are due to the interaction of modifying genes; and that *A* is not easily mutable, but that in addition to this gene for color there is present an inhibiting factor (*I*) showing complete dominance and a high mutation rate. Variegation is explained on the basis of the mutation of the inhibitor at different times during the ontogeny of the flowers.

5309. BRIEGER, F. G., G. E. TIDBURY, and H. P. TSENG. Genetic control of gametophyte development in maize. II. The quarter test. *Jour. Genetics* 36(1): 17-38. 1938.—Genes *Ga/ga* 1, 2, and 3 affecting growth rate of pollen tubes and consequently causing aberrations from expectation in the linked genes *Pr* 1/*pr* 1, *Bt* 1/*bt* 1, *C* and *Sh* of heterozygotes were studied by dividing the ear into quarters numbered 1-4 from tip to base and studying differential segregation caused by pollen tube elimination between quarters having long and short styles. Statistical analysis was done using Fisher's χ^2 distribution tables. The χ^2 total of $4n$ values was decomposed into its components from ear and quarter to see whether all components contributed proportional amounts to the total χ^2 . Segregation of yellow versus white in the cross "White Tyrol Flint" × heterozygous "Golden Bantam" derivative gave a deficiency of dominant yellow grains. Pollen from one plant behaved differentially on different ♀♀. Segregation of deep vs. pale yellow probably depends upon the degree of dominance of 2 allelic genes. The quarter test gave no indication of pollen tube competition.—*W. J. Haney.*

5310. BRÜCHER, H. Die reziprok verschiedenen Art- und Rassenbastarde von *Epilobium* und ihre Ursachen. I. Die Nichtbeteiligung von "Hemmungsgenen". *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 75(2): 298-340. 1938.—Of 4 races of *E. hirsutum* studied one (no. 43) is more dwarf than the others. This shows reciprocal differences in height and petal size in crosses with the other races, the hybrids being always smaller in stature and flowers when no. 43 is the ♀ parent, and such hybrids are pollen sterile. In backcrosses, fertile interracial hybrids of which *E. hirsutum* races nos 8, 11, or 29 are the ♀ parents give fertile progeny when pollinated by any of the 4 races. Pollen sterile hybrids on no. 43 give sterile progeny when pollinated by 8, 11, or 29, and a segregation for fertility, with 58%—75% of the backcross progeny full fertile, when pollinated by no. 43. Similar reciprocal differences were found in the crosses *E. hirsutum* 43 × *E. parviflorum* or × *E. adenocaulon*, but were absent or very small when other races of *E. hirsutum* were used. When interracial crosses were outcrossed with *E. parviflorum* or *E. adenocaulon*, the inhibiting effect of the plasma of race 43 was also evident, but when hybrids with weakly inhibiting races as the ♀ parent were used, distinct 1:1 segregations for height were observed. There were equally evident whether *E. parviflorum* was the ♀ or the ♂ parent. Race 43 appears to carry a segregating growth factor that stimulates growth of the interspecific hybrids. The same is evident from ratios obtained in F_2 populations of interracial crosses of

E. hirsutum. The inhibition of growth caused by *E. hirsutum* 43 is evident only in hybrids containing the plasma of this race, and does not segregate. The segregating growth factors of the *hirsutum* races do not produce such inhibitions, and that present in the nuclei of race 43 usually tends to promote rather than inhibit growth when placed in a different plasma than its own.—*G. L. Stebbins, Jr.*

5311. CATCHESIDE, D. G. The bearing of the frequencies of x-ray induced interchanges in maize upon the mechanism of their induction. *Jour. Genetics* 36(2): 321-328. 1938.—A study of x-ray induced interchanges has shown, in the F_1 progeny from irradiated pollen, that individuals with 2 rings of 4 chromosomes are slightly more frequent than those with a ring of 6 chromosomes. Similar relations between these 2 classes hold at different x-ray doses. These facts may be accounted for on the contact hypothesis or on the breakage hypothesis if it be supposed that structural rearrangements chiefly follow breaks occurring in nearby positions. The data cannot be used to decide whether translocations require one or more hits for their production.—*Auth. summ.*

5312. COOPER, D. C. Artificial induction of polyploidy in alfalfa. *Amer. Jour. Bot.* 26(2): 65-67. 2 fig. 1939.—A tetraploid individual ($2n=64$) was obtained from an inflorescence which had been subjected to a heat treatment of 42°C during the interval between 47 and 48 hrs. after pollination. The plant was highly sterile. Both bivalent and quadrivalent associations of chromosomes were present at diakinesis and on the heterotypic equatorial plates.—*D. C. Cooper.*

5313. DICKSON, HUGH. The inheritance of growth rate in *Neurospora crassa* with special reference to hybrid vigour and cytoplasmic inheritance. *Ann. Botany* 3(1): 113-129. 7 fig. 1939.—8 crosses were made between different strains of *N. crassa* and the growth rates of the segregants and parents detd. Growth rates smaller than, and intermediate between, those of either parent were found among the segregants, but in only one case was an apparent example of hybrid vigour established. This example of an apparently greater growth rate was due to the segregant type having a reaction to temp. different from that of its parents. In questions of the inheritance of physiological characters, deductions based on measurements made under only one set of environmental conditions are unsatisfactory and may readily lead to wrong conclusions. Cytoplasmic inheritance is demonstrable in this fungus. It affects both morphological and physiological characteristics.—*H. Dickson.*

5314. DORSEY, M. J. Peach breeding project. *Trans. Illinois Hort. Soc.* 71: 386-392. 1937.—Outlining briefly the technic of peach breeding employed, the author discusses some of the more recent developments, particularly with reference to the results of crosses in which J. H. Hale was used as one parent. Of 56 seedlings from the cross J. H. Hale × Elberta, 32 were freestones and 24 clingstones. All had yellow flesh. Good pollen occurred in 42 and typical aborted pollen of J. H. Hale in the other 14. Two of the more promising seedlings are described.—*Courtesy Exp. Sta. Rec.*

5315. HOFMEYER, J. D. J. Determination of sex in *Carica papaya*. *Farming in S. Africa* 13(150): 332. 1938.—Three main sex types occur in *C. papaya*: pistillate, hermaphrodite and staminate forms. Inter crosses between these types gave the following ratios:—pistillate × staminate = 1 pistillate:1 staminate; pistillate × hermaphrodite = 1 pistillate:1 hermaphrodite; hermaphrodite × staminate = 1 pistillate:1 hermaphrodite:1 staminate. These ratios might be explained by assuming that sex is fundamentally determined by allelic factors, namely, M_1 , M_2 and m . The different sex types will then be:—pistillate, mm ; staminate, M_1m ; hermaphrodite, M_2m . A linkage of $\pm 35\%$ was found between these sex factors and the genes Y_2 for yellows vs. white flower color. The M_2M_1 and M_2m sex types are apparently not viable. Yellow vs. red fruit flesh, R_r and purple vs. non-purple, P_p stem color show simple Mendelian inheritance, and no sex linkage. Various workers have shown that there is no distinctive sex chromosome present. In all types $n=9$.—*J. D. J. Hofmeyr.*

5316. HOLMES, FRANCIS O. The Chilean tomato *Lycopersicon chilense*, as a possible source of disease re

sistance. *Phytopath.* 29(2): 215-216. 1 fig. 1939.—*L. chilense* has not become available previously to horticulturists interested in disease resistance. The species and a hybrid with the tomato are now in hand. The hybrid is intermediate in many respects, but is characterized by finer cutting of leaves than appears in the garden tomato and by conspicuous stipules and floral bracts.—*F. O. Holmes.*

5317. HONING, J. A. *Canna* crosses. VI. Coupling in the factors for the red leaf margin. *Genetica* 21: 70-87. 1939.—Author did not verify his hypothesis of a plasmatic influence in *Canna* crosses (1931). 4 genes (color and leaf margin) in *C. indica* are postulated and related to 2 other forms (vars., although listed as spp.) of *Canna*. 2 of the genes are completely linked.—*E. W. Lindstrom.*

5318. HONING, J. A. *Nicotiana tabacum* crosses. The Kloempang dwarf factor. Polymery as to single and double flowers. Interaction of factors. A necrotic dwarf. A dwarf without ovules. *Genetica* 21: 109-152. 1939.—Description and history of some tobacco strains grown in Sumatra. Deviations from monogenic ratios involving the dominant Kloempang dwarf factor are discussed. Unexplained deviations in 15:1 ratios of single:double flowered types are recorded. Factorial interaction of these polymeric genes and a deformis gene is suggested. A monogenic necrotic dwarf type was isolated.—*E. W. Lindstrom.*

5319. HSIEN-PO, TSENG. Self-sterility in *Antirrhinum* and *Petunia*. *Jour. Genetics* 36(1): 127-138. 1938.—In a study of F_2 plants of crosses between cultivated *A. majus*, *A. hispanicum* and *A. latifolium*, all $2n=16$; in addition to epistatic fertility factor F , self sterile allelomorphs S_m were found which cause self-sterility and cross fertility in ff homozygotes. Linkage between the factors for peloric flame (Rad/rad) and self-sterility alleles is nearly complete in $\sigma\sigma$; crossing over occurs in $\varphi\varphi$. 3 conditions were demonstrated in *Petunia* hybrids: Single factor pair for dominant fertility F/f ; recessive fertility due to one other factor A/a dependent on modifiers; self-sterility due to ff , but with AA , Aa or aa with particular modifiers present.—*J. S. Potter.*

5320. KOSTOFF, DONTCHO. Directed heritable variations conditioned by euploid chromosome alterations. *Jour. Genetics* 36(3): 447-468. 1938.—Morphological variations conditioned by autopolyploidy and allopolyploidy were studied in various spp. and hybrids in *Nicotiana*, *Solanum*, *Petunia*, and *Triticum*. The size of cells (stomata, pollen grains, root perilem, pollen mother cells, pollen tube thickness) and cell contents increase with euploid increase in chromosome number, and decrease with euploid reduction in chromosomes. The breadth of leaves in respect to length and leaf thickness increases with euploid increase in chromosome number, from haploid through tetraploid. The size and weight of seeds, and the vegetative period of plants increase with euploid increase in chromosome number. A $4n$ tomato was more cold resistant than its $2n$ parent. Size of plant and flowers may increase or decrease when euploid increase in chromosomes takes place.—*H. E. Warmke.*

5321. LARSEN, C. SYRACH, and M. WESTERGAARD. Contributions to the cytogenetics of forest trees. I. A triploid hybrid between *Larix decidua* Miller and *Larix occidentalis* Nutt. *Jour. Genetics* 36(3): 523-530. 1 pl. 1938.—From a cross, *L. decidua* ♀ ($2n=24$) × *L. occidentalis* ♂ ($2n=24$) only 1 plant resulted—a triploid hybrid ($2n=36$ in root tip mitoses). The hybrid is probably the result of a fertilization between a normal egg cell of *L. decidua* and a diploid (unreduced) pollen grain of *L. occidentalis*. The principal features of the morphology of this hybrid are described and its possible practical forestal value is discussed.—*Auth. summ.*

5322. McLEAN, FORMAN T. A bigeneric gladiolus hybrid. *Contr. Boyce Thompson Inst.* 10(2): 189-190. 1 fig. 1939.—Sterile hybrids of *Aniholiza revoluta* × gladiolus hybrid "Byron L. Smith" are described.—*F. T. McLean.*

5323. NIJDAM, F. E. The colour of the flowers of *Trifolium pratense* L. *Genetica* 21: 16-28. 1939.—Three pairs of genes control flower color in red clover, producing shades yellowish-white, purple-red, pink, blue and bluish-pink (illustrated in color plates). Yellowish-white is due to recessive g (no anthocyanin). Genes B and E (epistatic to G) produce purple-red ($b=pink$, $e=blue$, $be=pink$

with dull blue shade) and are linked with 36-42% crossing over.—*E. W. Lindstrom.*

5324. ODLAND, T. E., and ROBERT LEPPER, Jr. A crinkle leaf mutation in alfalfa. *Jour. Amer. Soc. Agron.* 31(2): 128-130. 2 fig. 1939.—Breeding work with alfalfa has been in progress at the Rhode Island Expt. Station for the past 10 years. Among other strains, selections, and hybrids obtained from various sources was an F_1 hybrid obtained from the Cornell Expt. Station. In this hybrid an abnormality in the F_2 occurred which causes a crinkling of the leaf. In this abnormality the leaf appears puckered and the margin has an irregular conformation due to an extension of tissue at the periphery. The abnormality was apparently brought about by the epidermis and mesophyll growing at a more rapid rate than the vascular tissue. The presence of a large amount of crinkle leaf was detrimental to the plant and resulted in stunted growth and a very limited production of flowers or seed. The crinkle condition was not apparent in the F_1 . In an F_2 progeny of 418 plants, 244 were normal, i.e., without crinkle, and 174 plants had varying degrees of it. 13 F_3 families were grown, to determine the type of inheritance involved. The progenies varied from those breeding true for normal to several with a high percentage of crinkle. It is suggested that a 3-factor-pair difference is involved. Modifying factors, causing variations in the degree of crinkle, are probably involved also.—*T. E. Odland.*

5325. OEHLKERS, F. Über die Erbllichkeit des cruciata-Merkmal bei den Oenotheren; eine Erwiderung. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 75(2): 277-297. 1938.—The "somatic conversion" theory of Renner was tested on a number of hybrids between cruciate and normal strains of *Oenothera*. In the cross *O. biennis cruciata* × *O. lamarckiana brevistylis* the combination *albicans-gardens* showed no crossing over between Cr and cr , while in the combination *albicans-velans* 50% crossing over between Cr and cr was found; this percentage was reduced in plants grown under dry conditions with alternating temp., a treatment which is known to reduce chromosome pairing. A cruciate plant derived from *lamarckiana normal* × *lamarckiana cruciata* gave in its progeny homozygous cruciate, heterozygous cruciate and homozygous normal, indicating that in this cruciate plant cr had become dominant. Different races of *O. biennis* and *O. suaveolens* vary in the degree of dominance of Cr over cr . The race *O. biennis* Hannover, which showed the weakest dominance of Cr over cr , gave the largest percentage of cr plants after 14 generations of selfing homozygous normals. This evidence is discussed in the light of Renner's theory, and indicates that the author's hypothesis of lability or increased mutability of the cr gene is more likely than the conversion hypothesis.—*G. L. Stebbins, Jr.*

5326. POOLE, CHARLES F., and PAUL C. GRIMBALL. Inheritance of new sex forms in *Cucumis melo* L. *Jour. Heredity* 30(1): 21-25. 1 fig. 1939.—Hermaphrodite, a sex type new to *Cucumis*, when crossed to monoecious, produced F_2 ratios of 9 monoecious:3 gynomonocious:3 andromonoecious:1 hermaphrodite; indicating 2 pairs of factors for sex habit—an hypothesis confirmed by backcrosses to both parents. These data reveal conflicts within and between taxonomic and genetic viewpoints concerning criteria for judging primitive and advanced characters.—*C. F. Poole.*

5327. POST, THELMA BENNETT. "Ruffled" coleus. A new unstable gene. *Jour. Heredity* 30(1): 27-31. 2 fig. 1939.—In 1931 a coleus plant that in appearance suggested the Savoy vars. of cabbage was received from a florist. The leaves were characterized by a thickened and ruffled appearance while the color, a reddish-maroon and green, was dull. The ruffling persisted both in the parent plant and in cuttings taken from it. Among volunteer seedlings which appeared under the plant, some had normal, flat foliage while others were ruffled like the parent. The color of the normal plants was similar to that of the ruffled but brighter and differed in distribution. Attempts to produce the condition by virus transmission were negative. Progenies of 21 normal and 12 ruffled plants indicate that "ruffled" is a mono-genic dominant to normal; but, that it is very unstable, mutating both ways. The gene mutates in somatic tissues also.—*T. B. Post.*

5328. SANSOME, E. R. A cytological study of an F_1 between *Pisum sativum* and *P. humile*, and of some types from the cross. *Jour. Genetics* 36(3): 469-500. 1 pl., 35 fig. 1938.—The species-hybrid has 2 associations of 4 at meiosis: one occurs frequently and the formula suggested for this association is $ABX.YBCX.YCD.DA$, chromosomes ABX , YCD coming from *P. sativum*, and $YBCX$, AD from *P. humile*. The formulae suggested for 2 unbalanced types derived from back-crossing the F_1 to *P. sativum* are $ABX.ABX.YBCX.YCD$ (chain type) and $ABX.ABX.YBCY.YCD$. (duplicated-end type). The duplicated-end chromosome probably results from crossing-over in the C segment in the F_1 , and is associated with abnormal ratios for yellow-green cotyledons. It is assumed that the factor for yellow cotyledons is in $YBCY$, and that deficiency of yellows results from low viability of gametes carrying this chromosome. The chiasma frequency per single B and X segment is about equal in the F_1 and the derived chain type which is trisomic for these segments. Pollen abortion in the duplicated-end type is low, in the derived chain about 50%; therefore pollen-grains with Y duplicated and D deficient are apparently viable (though not necessarily functional), while those with X duplicated and D deficient are abortive.—*E. Sutton*.

5329. SCHEIBE, A. Zuchtprobleme bei der Sonnenblume. *Züchter* 10(5): 126-132. 1938.

5330. SWEET, E. D. Chiasmata, crossing-over and mutation in *Oenothera* hybrids. *Jour. Genetics* 35(3): 397-419. 1 pl., 25 fig. 1938.—From cytological study of 24 species-crosses the following results were obtained: Independent segregation occurs in the 2 rings of F_1 *O. purpurata* \times *novae-scotiae*, giving a new viable ring-forming type in F_2 . Structurally homozygous types of *O. rubricalyx* segregated in F_2 's from crosses made with heterozygous *rubricalyx*. F_1 catenations previously unknown were inferred from the configurations in genetically similar F_2 's from the crosses *O. pycnocarpa* \times *rubricalyx* ($10+2$ ②), *novae-scotiae* \times *blandina* ($6+4+2$ ②), and *erensis* \times *angustissima* ($3+4+2$ ②). The maximum catenation in F_1 *erensis* \times *rubricalyx* is $10+4$. A trisomic with peculiar characteristics was found in F_2 from *deserens* \times *nutans*. It has the catenation $10+2+3$. Statistical treatment of pairing frequencies in the trivalent gives evidence of interference between chiasmata. Two figures-of-eight were found in this trisomic. They are assumed to be due to crossing-over between translocated segments in opposite complexes, which results in interchange. In one the interchange was between corresponding segments; in the other between non-corresponding segments; the latter can give rise to half-mutants.—*E. Sutton*.

5331. VARIOUS AUTHORS. Recent linkage studies in maize. Maize Genetics Cooperation. *Genetics* 24(1): 59-63. 1939.—This article consists of 6 short linkage papers published collectively. I. H. K. HAYES and M. S. CHANG reported linkage of virescent seedling-16 (v_{16}) with j_1 and ms_8 . Order of genes and recombination percentages: v_{16} 14 ms_8 10 j_1 . II. H. K. HAYES and M. S. CHANG. Zebra seedling-6 (z_{b6}) linked in chromosome 4. Order of genes and recombination percentages: su_4 13 z_{b6} 23 Tu 20 gl_4 . III. H. K. HAYES. Zebra seedling-4 (z_{b4}) linked in chromosome 1. Order of genes and recombination percentages: P 7 z_{b4} 28 j_1 3 br 46 bm_4 . IV. H. K. HAYES. Ramosa-x (ra_x) found allelic with ramosa-2 (ra_2). V. RALPH SINGLETON. Opaque-2 (o_2) linked in chromosome 7. Order of genes and recombination percentages: o_2 16 ra_2 21 gl_4 18 j_1 . VI. M. M. RHOADES. White sheath-3 (ws_3) is linked in chromosome 2. Order of genes and recombination percentages: ws_3 11 gl_4 19 gl_4 . On the basis of genetical and cytological data, a genetic map of chromosome 2 estimated to be 178 units.—*D. G. Langham*.

5332. WU, SHAO-KWEI. The relationship between the origin of selfed lines of corn and their value in hybrid combination. *Jour. Amer. Soc. Agron.* 31(2): 131-140. 1939.—Inbred lines used in making single crosses for this study were obtained by the pedigree method of breeding. Four original parental inbred lines, 49, 8-29, 9-29, and 15-28, descending from 4 vars., were involved in making crosses in such a way that in each cross one of the parents was highly desirable in withstanding lodging and the other in certain other agronomic characters. The inbred lines fur-

nished by the Division of Agronomy and Plant Genetics were placed in 3 groups according to their parentage, group I, inbred lines being obtained from the crosses made between the original parental inbreds, 49 and 9-29; group II from the crosses made between 15-28 and 8-29; and group III from the crosses between 15-28 and 9-29. The single crosses made from inbred lines selected from a single cross yielded, on the average, consistently lower than the single crosses made from inbred lines with one parent in common, or the single crosses made from inbred lines of diverse genetic origin. There was no significant difference in yielding ability between the single crosses made from inbred lines with one parent in common and those made from inbred lines of entirely different genetic origin.—*H. K. Hayes*.

ANIMAL (EXCEPT MAN)

5333. ASMUNDSON, V. S. Note on a Bronze-Bourbon Red mosaic. *Jour. Genetics* 35(1): 25-30. 3 pl. 1937.—A mosaic occurred in the F_2 of a cross of a Bronze ♂ on a Bourbon Red ♀ turkey. This bird was bronze on the head, neck, shoulders, tail and part of the rump, with some patches of bronze feathers surrounded by red on the wings. The rest of the bird was covered with feathers typical of the Bourbon Red breed which thus formed a continuous band around the middle of the body. The difference in the plumage color of the 2 vars. was found to depend upon a single pair of autosomal genes, the ratio in the F_2 being 1 Bronze to 2 F_1 pattern to 1 Bourbon Red. The hybrids resembled the Bronze more than the Bourbon Red, particularly in down pattern and adult plumage, but were readily distinguished from both parental breeds. The possible mechanisms that may account for this case are discussed.—*Auth. summ.*

5334. CATCHESIDE, D. G. The effect of x-ray dosage upon the frequency of induced structural changes in the chromosomes of *Drosophila melanogaster*. *Jour. Genetics* 36(2): 307-320. 1938.—The frequency of induced structural changes of chromosomes observed in F_1 ♀ larvae from x-rayed ♂♂ shows a direct linear proportionality with the dosage between 1000 and 4000 r.u. The relation of this fact to the "breakage" and "contact" hypotheses of their induction is discussed. Both hypotheses theoretically require sigmoid curves (with different characteristics) connecting dosage and effect. At intermediate doses the relation would be approx. linear on both hypotheses. The observations therefore provide no basis for discrimination. The high frequency (11%) of rearrangements, which on the contact hypothesis would require 3 or more threads in contact at one point, makes it unlikely that the chromosomes are ever in contact before, during or after irradiation unless they completely fill the treated nucleus. The high frequency of inversions in one chromosome arm, relative to interchanges between different arms, demonstrates a spatial preference either in the refusion of breakage ends or in a grouping of original breaks through a contact or analogous mechanism.—*Auth. summ.*

5335. DOBZHANSKY, TH., and D. SOCOLOV. Structure and variation of the chromosomes in *Drosophila azteca*. *Jour. Heredity* 30(1): 3-19. 8 fig. 1939.—*Drosophila azteca* has 5 chromosome pairs, including a V-shaped X-chromosome, 3 pairs of autosomes with submedian to subterminal spindle attachments and a pair of microchromosomes. In the salivary gland nuclei (map shown) 6 long and one very short chromosome strand are present. Comparison shows that, aside from inversions, some translocations have taken place in phylogeny. The gene arrangement in the three longest chromosomes is variable. The species may be said to be differentiated into chromosomal races. Three types of multiple inversions are encountered. The geographical distribution of the chromosomal types shows a similarity between the populations inhabiting west-central California, U. S. A. and the State of Durango, Mexico, hence the presence of identical chromosomal types on opposite sides of a natural barrier indicates either that these types are phylogenetically primitive, or that much of the chromosomal variability now detectable in the species has arisen in the remote past and has been retained ever since.—*Authors*.

5336. ELOFF, G. The effect of ultra-violet radiation on crossing-over, and on wing development in *Drosophila*

melanogaster. *Genetica* 21: 29-40. 1939.—U.-v. radiation increased crossing-over between genes for yellow and white. Irradiation for 60 min. with a quartz mercury vapor lamp caused a high percentage of wing abnormalities.—E. W. Lindstrom.

5337. FALKENSTRÖM, G. Eine Kreuzung im Freien von *Drosophila melanogaster* ♂ und *Dros. funebris* ♀ samt Beschreibung der Bastardgeneration und einiger Eier derselben. *Genetica* 21: 41-69. 1939.—From a single, accidental mating of one *D. melanogaster* ♂ and one *D. funebris* ♀, 14 hybrid offspring were derived whose characters are described. A few eggs only were obtained from some F₁ matings and these are described. From such data, the author generalizes on the futility of comparing the results of species crosses with race (fertile crosses below the species) crosses from the phylogenetic standpoint, maintaining that the 2 are on a different level from an evolutionary standpoint.—E. W. Lindstrom.

5338. FORTUYN, A. B. DROOGLEEVER. A mutation from agouti with recessive spotting to dominant spotting in *Mus musculus*. *Genetica* 21: 92-96. 1939.—The origin by mutation of dominant spotting was observed in an agouti-and-white strain. As is true for dominant spotting in other mice, the color in the new mutant strain is a single dominant character carried by a gene which is lethal when homozygous. Whether the gene is also responsible for anaemia, as it is in other cases, could not yet be detd. for this new strain.—E. W. Lindstrom.

5339. FORTUYN, A. B. DROOGLEEVER. A polydactylous strain of mice. *Genetica* 21: 97-108. 1939.—A highly inbred strain of *Mus musculus* is described in which 12% of the ♂♂ and 18% of the ♀♀ are polydactylous. This polydactyly is the only abnormality occurring in these mice. In most cases only the first digit (big toe) of the right hind foot is more or less duplicated, but the left foot and other toes may also be affected. Abnormal fathers transmit the peculiarity more often to their daughters than to their sons. This fact cannot be explained on a genetic basis, since for various reasons genetic differences between these mice cannot be assumed to exist. In general, polydactylous mice have an excess number of motor neurons innervating the foot in the spinal cord on the abnormal side. This may be the cause of polydactyly, as is shown in *Amphibia*.—E. W. Lindstrom.

5340. FRIESEN, H. Mechanism of crossing-over in males of *Drosophila melanogaster*. *Jour. Genetics* 35(2): 141-150. 1937.—Experiments with different stocks show that x-ray induced crossing-over in ♂♂ is not confined to certain stocks. The high percentage of cross-over chromosomes obtained in viable homozygous combinations shows that the chromatid exchange produced by x-rays is at homologous loci (normal crossing-over), since exchange in non-homologous loci would have produced duplications and deficiencies lowering viability. Crossing-over in the 3d chromosome is chiefly in the central region, in which the greatest increase is also obtained when ♀♀ are x-rayed: this indicates a common mechanism in both sexes. In ♂♂ crossing-over is suppressed by inversions less than in ♀♀. Forces of attraction between homologous loci are supposed to be lower in ♂♂ than in ♀♀, and to be increased in both by x-raying; attraction between spindle-attachments is not necessarily decreased in ♂♂, so that crossing-over may take place near these points.—E. Sutton.

5341. GREENWOOD, ALAN W., and J. S. S. BLYTH. Sex dimorphism in the plumage of the domestic fowl. *Jour. Genetics* 36(1): 53-72. 1938.—The paper reviews the major genetical and physiological investigations which have contributed towards an analysis of sexual dimorphism in the plumage of the domestic fowl.—R. A. Miller.

5342. GRÜNEBERG, HANS. Some new data on the grey-lethal mouse. *Jour. Genetics* 36(1): 153-170. 1938.—The deviation from the expected 3:1 ratio in production of grey-lethals is due, probably, to post-natal elimination. The lack of secondary bone absorption is not due to a lack of osteoclasts. Investigation of the inner organs revealed only 2 relevant anomalies; the cortex of the thymus degenerates during the 3d week of life as a result of the poor condition of the mouse; anatomical irregularities make it probable that the grey-lethal suffers from neuralgia of the mandible and lower lip. The latter condition makes

the young reluctant to suckle, thus reducing food intake. The causal relationships of "pleiotropic" effects of the grey-lethal gene are discussed. It is suggested that bone and pigment anomalies may be connected causally in some unknown way.—J. S. Potter.

5343. IRWIN, M. R. Immuno-genetic studies of species relationships in Columbidae. *Jour. Genetics* 35(3): 351-373. 1938.—A comparison is made of the species-specific and homologous characters in the erythrocytes in 4 species of pigeons and doves. Two of the specific characters of *Columba guinea*, by which it is differentiated from *C. livia*, have homologues in both Pearlneck and Ring dove. Certain other similarly distinguishing characters are shared in part by either or both latter species, while others are presumably present only in *livia*. A genetic character which distinguishes one species from another may evidently in turn be shared with still another species, or may be solely confined to one species.—G. Erdworm.

5344. LAW, LLOYD W. The effect of specific genes on the size character tail ring number in *Mus musculus*. *Genetica* 21: 1-15. 1939.—In *M. musculus*, gene *d* (dilution of coat color) influences an increase of tail rings but the gene for brown coat color does not. The chromosome marked by the *A* gene also carries size factors for tail ring growth. The character tail-ring number cannot be monogenic but must be due to at least 2 pairs. No evidence for modifying genes on the Y chromosome was found.—E. W. Lindstrom.

5345. MAINX, F. Analyse der Genwirkung durch Faktorenkombination. Versuche mit den Augenfarbenfaktoren von *Drosophila melanogaster*. *Zeitschr. Indukt. Abstamm.-u. Vererbungslehre* 75(2): 257-276. 1938.—Based on the fact that the double recessive *brown* and *scarlet* (*bw bw st st*) fly has white eyes, a series of expts. was conducted to determine the effect of 28 eye color genes on the production of the red and the brown components of the eye pigment. The genes which in the double recessive combination with *st st* give a low intensity of pigmentation give a high intensity with *bw bw*, and vice versa. This shows that some genes affect primarily the red and some chiefly the brown pigment of the eye. The dark mutants *clot* (*cl²*) and *sepia* (*se*) affect the chemical nature rather than the degree of development of the pigments, and so give deeply colored eyes in the double recessive condition with both *bw* and *st*. These facts were verified by examination of sections of eyes of various types. By cutting off the heads of fresh wild flies and placing them in water the red component was extracted, demonstrating its water solubility. The brown is much less water soluble; neither is soluble in alcohol, ether, petrol ether, H₂SO₄, or chloroform. The *se* gene causes oxidation of the red, water soluble pigment.—G. L. Stebbins, Jr.

5346. MEYER, HENRY. Investigations concerning the reproductive behaviour of *Mollienisia "formosa"*. *Jour. Genetics* 36(3): 329-366. 1938.—In nature a form (known as *Mollienisia "formosa"*) apparently hybrid between *M. sphenops* and *M. latipinna* exists as a purely ♀ population. Matings of these to ♂♂ of either parental species produce ♀ offspring only, all of the maternal type. *M. "formosa"* ♀♀ apparently do not reproduce by parthenogenesis. There is no differential death-rate either before or after birth nor any tendency toward hermaphroditism. Sex reversal is improbable. Suggested theory for purely matroclinal inheritance: When eggs of *M. "formosa"* are fertilized by sperm of *M. sphenops* or of *M. latipinna* the embryos contain both maternal and paternal chromosomes, but the latter are incapable of affecting the nature of the offspring in the presence of the foreign cytoplasm and maternal chromosomes. When the eggs of the back cross ripen a selective maturation takes place so that all the paternal chromatin is eliminated into the polar body. Thus each generation retains the maternal form and is unaffected by paternal chromatin.—E. N. Ward.

5347. SCHWIER, HEINZ. Über fertile Makropodenbastarde. *Zool. Anz.* 123(10/12): 247-251. 3 fig. 1938.—Hybrids obtained from reciprocal crosses between *Macropodus opercularis* and *M. o. concolor* are alike in color pattern. Body shape and fins of the hybrids lean towards *concolor* while the color pattern is more like that of *opercularis*.—L. H. Hyman.

5348. STUBBE, A. E. Die Wirkungen verschiedener Reizung mit erhöhter Temperatur auf das Zeichnungsmuster zweier Stämme der Mehlmotte *Ephestia kühniella* Zeller. *Zeitschr. Indukt. Abstamm.- u. Vererbungslehre* 75(2): 233-255. 1938.—This work is a repetition of Feldotto's and Wulkopf's expts. on the influence of heat treatment (45° for 45 min.) during different pupal stages on the wing-pattern of *Ephestia* and a comparison of their results with the effect of warmth (35° for 24 hrs.) on the pattern. Heat influenced different stocks of *Ephestia* to a different but similar extent. For the pattern elements themselves heat- and warmth-treatment showed similar reactions but in a different extent for some elements (the bands, the middle-spots and the marginal spots). The elements of the "infield" were specially modified by warmth, those of the "outfield" by heat. Warmth- and heat-treatment however produced opposite reactions in regard to the size of the "infield" and the degree of sharpness of the indentations of the bands. Both agents impaired individual vitality. The sensitive periods for the different elements and their maximum and minimum for heat- and warmth-treatment are given.—W. Braun.

5349. WATCHORN, ELSIE. Some biochemical data on the grey-lethal mouse. *Jour. Genetics* 36(1): 171-176. 1938.—Grey-lethal mice have low liver glycogen levels and low blood P values, the organic P compounds especially being reduced. Muscle glycogen was normal but there was a tendency toward low blood-sugar values.—J. S. Potter.

5350. WU, J. S. Analysis of the testis size in *Drosophila pseudo-obscura* hybrids. *Jour. Genetics* 35(1): 73-81. 1937.—Two races were studied to analyze testis size in σ^2 hybrids of inter- and intraracial crosses. Race A σ^2 possess larger testes than σ^2 of Race B; mutant stocks show slightly greater variation in testis size than normal wild-type strains. Testis size increases in intraracial hybrids and decreases in interracial hybrids as compared with that in parental stocks. This seems to be due to a complex interaction between complementary genetic factors in the hybrid chromosomes and the cytoplasm rather than to a simple interaction between foreign chromosomes and the egg cytoplasm or an interaction between hybrid chromosomes alone. The modifying effect of the cytoplasm may be due to cytoplasmic differentiation conditioned by genic differentiation in the genetic system of the different geographical lines. Sex-linked mutations may have no general additive effect on testis size, but particular sex-linked mutant genes do exert some effect on testis size.—R. C. Bate.

MAN

5351. BRANDER, T. Ein Gesichtspunkt zur Frage Alkohol und Nachkommenschaft. *Zeitschr. Mensch. Vererbungs- u. Konstitutionsl.* 22(1): 61-68. 1938.—Much of the inferiority evident in the descendants of alcoholics is of a constitutional nature. Such abnormalities can arise through germinal transfer, changes in the germ plasma as well as through the influence of peristaltic factors that act intrauterinally, intrapartum and extrauterinally. It is possible that a part of the inferiority in the children of alcoholics may be accounted for by premature birth caused by alcohol.—I. Dordick.

5352. FLEMING, R. M. Physical heredity in human hybrids. *Ann. Eugenics* 9(1): 55-81. 1939.—Observations on over 300 cases of hybridization in English and Welsh seaports are given. Color of eye, skin, and hair, type of hair, presence of Mongolian fold, type of jaws and teeth, shape and measurements of face and head, and stature were noted. Cases include 119 F_1 of σ^2 Chinese \times φ^2 white; 110 F_1 of σ^2 negro \times φ^2 white; backcrossing; F_2 and subsequent generations; very mixed racial ancestry. Certain Chinese or negro characters in skin, eye and hair showed dominance over white in F_1 . Backcrossing lessened the intensity of heredity of the characters derived from the incoming blood, but did not altogether swamp it. In F_1 σ^2 negro \times φ^2 white there was absence of segregation of skin color either to pure negro or to pure white, but great variability of intermediate shades. Even in backcrossing to negro or to white complete segregation in skin color to either side was not common. In negro-white hybrids cases

of disharmony of the jaws so marked as to interfere with speech occurred.—R. M. Fleming.

5353. KLEMOLA, ERKKI. Essentielle Hypertonie bei 23-jährigen eineiigen Zwillingen. *Zeitschr. Mensch. Vererbungs- u. Konstitutionsl.* 22(1): 69-76. 3 fig. 1938.—A report of identical twin sisters in whom, at the age of 23, an essential hypertension was ascertained. Over a period of 4 years during which the pair was under observation there was no roentgenological evidence of cardiac hypertrophy in spite of the stable hypertension (160/105 mm. Hg to 210/110 mm. Hg). In the EKG changes were ascertained that indicated the presence of a coronary insufficiency. In this case hypertension is apparently recessively inherited.—I. Dordick.

5354. LEVIT, S. G. Genetical analysis of selected human data bearing on the genetics of hermaphroditism. *Jour. Genetics* 35(2): 151-159. 1937.—It is difficult to draw conclusions as to inheritance from published pedigrees because of the bias of physicians in selecting interesting families that warp the genetical picture. The author criticizes the conclusion drawn by Petterson and Bonnier, 1937, based on such data. Since not all families come under the investigator's observation one makes use of the binomial expansion of $(p+q)^s$ where p is the probability of an affected child, q of a healthy child. Thus, among fraternities with a total of s children in q^s fraternities there will be no affected children. Expectation in affected children in fraternities which do come under observation will equal $p/(1-q^s)$. If the analysis includes only fraternities with 2 affected, the expected number of offspring in a fraternity with s children will be

$$\frac{sp(1-q^{s-1})}{1-q^s-spq^{s-1}}$$

—C. B. Davenport.

5355. PARADE, S. W., und W. LEHMANN. Elektrokardiographie bei Zwillingen. *Zeitschr. Mensch. Vererbungs- u. Konstitutionsl.* 22(1): 96-104. 6 fig. 1938.—Comparative electrocardiographic studies were carried out upon 106 pairs of twins—53 monozygotic pairs, 39 dizygotic pairs of the same sex and 14 dizygotic pairs of opposite sex. Comparison of the EKG's of the monozygotes with those of the dizygotes shows a great preponderance of similar EKG's in the former. Thus 25 were similar, 22 very similar and 6 different. When the individual deflections of the EKG's are compared it is seen that the auricular deflection, the auricular ventricular complex and the direction of the principal deflection are predominately very similar or similar in the monozygotes. But in the dizygotes the waves of the EKG exhibit greater differences. Measurement of the height of R showed no difference between the monozygotes and the dizygotes. Various environmental factors such as displacement of the direction of the electric axis of the heart, conditions of conduction in the heart and cardiac diseases can bring about differences in the EKG's of monozygotes.—I. Dordick.

5356. SCHEIDT, W. Das Erbgefüge menschlicher Bevölkerungen und seine Bedeutung für den Ausbau der Erbtheorie. [The hereditary structure of human populations and its meaning for the completion of the theory of heredity.] 59p. Fischer: Jena, 1937. RM 3.60.—This paper discusses especially the problem of polymery, the frequency of hereditary stigmata in certain families, and questions concerning the relations between psychology and heredity.—P. L. Krieger (courtesy of Psych. Abst.).

5357. SOLTAU, O. Ein klinisch-genealogischer Beitrag zur Frage der hereditogenetischen Nervenerkrankungen: Krankheitsformen in einer mit Huntingtonischer Chorea belasteten Familie. (A clinical-genealogical contribution to the problem of hereditary degenerative nerve disease: disease forms in a family tainted with Huntington's chorea.) 40p. Passavia: Passau, 1938.

5358. TAYLOR, G. L., and AILEEN M. PRIOR. Blood groups in England. III. Discussion of the family material. *Ann. Eugenics* 9(1): 18-44. 1939.—The heredity of the blood groups of the ABO and MN systems as exemplified by parents and children, tested in England and described in previous papers, has been examined statistically and found to conform to accepted genetic theory. A new

statistical method, suggested by R. A. Fisher, of dealing with data on the extended ABO system has been used and explained.—*Authors.*

5359. WATZLAWIK, E. Vererbung von Psychopathien

unter besonderer Berücksichtigung von rückfälligen Verbrechern. (The inheritance of psychopathies, with special reference to habitual criminals.) 35p. Noske: Bornaleipzig, 1937.

BIOMETRY

JOHN W. GOWEN, *Editor*

(See also in this issue Entries 5302, 5358, 6616)

5360. MAHONEY, CHARLES H., and W. D. BATEN. The use of the analysis of covariance and its limitation in the adjustment of yields based upon stand irregularities. *Jour. Agric. Res.* 58(5): 317-328. 1939.—The analysis of covariance between yield of marketable ears and stand of plants is presented for 26 hybrid strains and 1 open-pollinated strain of sweet corn. The yield data for 5 plots were lost, and a method of estimation for these missing plots is given. The correlation coefficient for error exceeds the 1% level, and an equation is given by which it is possible to adjust the yields on stand for each of the 108 plots. A short method of deriving an analysis of variance for adjusted yields without the necessity of actually adjusting individual plot yields is presented. That this method is mathematically correct is substantiated by the derivation of essentially identical analyses of variance by both methods. The efficiency was increased by adjusting yields. Another example is presented of maize planted in a 10×10 Latin square in which there was a significant residual correlation between yield and stand. The efficiency of the expt., however, was not increased by adjustment of yield on stand in this case. Data are presented for a fertility expt. with tomatoes grown from transplants. In this case treatment variance and the correlation coefficient between yield and stand were not significant, yet the efficiency gained in adjusting yield on stand is indicated when the adjusted treatment means are compared with the check (no treatment). Additional data are presented, however, from a fertilizer placement test with Refugee beans. In this case the value of *F* for yields was not significant after adjusting for stand.—*Auth. summ.*

5361. SAVUR, S. R. A note on the arrangement of incomplete blocks, when $\kappa=3$ and $\lambda=1$. *Ann. Eugenics* 9(1): 45-49. 1939.—A rather general method of finding arrangements in incomplete blocks is presented, and solutions for 12, 26, 35, 70 and 100 blocks (9, 13, 15, 21 and 25 vars., respectively) are exhibited.—*S. R. Savur.*

5362. STEVENS, W. L. Distribution of groups in a sequence of alternatives. *Ann. Eugenics* 9(1): 10-17. 1939.—Consider data which consist of 2 alternative observations arranged in a linear sequence, such as, e.g., the list of fine and wet days during a year. If a run of observations of

one type be called a group, then data can deviate from randomness, by having either too few or too many groups, indicating respectively positive or negative correlation between successive observations. Treating the totals of the 2 types of observation as ancillary information, this paper finds the exact sampling distribution of the number of groups. If the ends of the sequence are joined up, so that the number of groups of either type are equal, then the probability of ρ groups, when there are respectively ω_1 , ω_2 observations of the 2 types, is the probability of the independent contingency table

$$\frac{\rho(\omega_1 - \rho)}{\omega_2 \rho(\rho - 1)} \frac{\omega_1}{\omega_2(\omega_1 - 1)} \frac{\omega_2 - 1}{\omega_1 + \omega_2 - 1}$$

and the test of significance is made by the usual test for independence.—*W. L. Stevens.*

5363. STEVENS, W. L. The completely orthogonalized Latin Square. *Ann. Eugenics* 9(1): 82-93. 1939.—Exptl. design in agriculture and biology makes constant use of Graeco-Latin and higher orthogonal sets of Latin squares. The largest number of mutually orthogonal Latin squares of sides which may be possible is $(s-1)$, and this paper proves that complete sets exist for sides which are any powers of any primes. The proof rests on identifying a square with the formula

$$\mu_\lambda \mu_x + \mu_y \begin{cases} \mu \pm 0 \\ \mu_x, \mu_y = 0, 1, \dots, \mu_{s-1} \end{cases}$$

where the symbols are marks in a finite field, μ_λ is a constant for one square, and the formula gives the mark to be inserted in row μ_x and column μ_y . The $(s-1)$ values for μ_λ , other than 0, generate the $(s-1)$ mutually orthogonal squares. Completely orthogonalized squares are given for $s=16, 25, 27, 32, 49, 64, 81$, and 125.—*W. L. Stevens.*

5364. TIZZANO, A. Alcune applicazioni della statistica in biologia. [Some applications of statistics to biology.] *Riv. Patol. Sperim.* 3: 475-489. 1937.—The author reviews various applications of the statistical method used in the biological field for group phenomena or for experiments repeated in order to obtain data for frequency curves.—*L. Canestrelli (courtesy Psych. Abst.).*

ECOLOGY

Editors

W. C. ALLEE, *Terrestrial Animal Ecology*
G. D. FULLER, *Terrestrial Plant Ecology*
CHANCEY JUDAY, *Hydrobiology (Oceanography, Limnology)*

FREDERICK A. DAVIDSON, *Ecology of Wildlife Management—Aquatic*
W. L. McATEE, *Ecology of Wildlife Management—Terrestrial*

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Breeding behavior, raccoons, 5664; Human ecology—negro-white competition, 6210; Bioclimatics, 6506; Bioclimatics—mosquitoes, 6707; Cycles in population of potato insects, 6697; Arthropods of corn fields, 6698; Population growth in protozoa, 6764; Protozoa, 6772; Subterranean fauna, 6836; Cave-dwelling mite, 6851; Bipolar dist. of tick, 6856; Spiders, 6864; Synchronous flashing of firefly, 6869; Chironomid larva, 6904; Apidae, 6927; Adaptational form changes during growth of fish, 6969; Body weight of birds, 7018; Social behavior in heron, 7019; Geographical variation in wood rat, 7046. [PLANT ECOLOGY]: Species concept and ecotypes, 5266; Geochemistry of cobalt-containing foods, U. S., 5518; Air dissemination of fungus spores, 6046; Humidity requirement of wood-rotting fungi, 6337; Lichen communities on limestone vs. sandstone, 6367; Rubus in Scandinavia, 6413; Migration of Alpine plants along valleys, 6438; Vegetation of Grand Isle, Louisiana, 6439; Reproduction in Ranunculus, 6449; Range improvement, 6483; Internat. grasslands congress, 6493; Rainfall run-off, 6496; Water conditioning for greenhouses, 6522; Soil water and tree growth, 6531; Humidity on transpiring leaf, 6598; Plant foods of Nothotherium, 7048)

GENERAL

5365. BRANDT, WALTER. Biotypology. II. Growth as factor of development of the individual types and of the ecological types of man. *Acta Biotheoretica* 4(2): 119-132. 1938.—Growth consists of several successive phases; these are influenced—accelerated or retarded—by the ecological milieu. In "isodromic" individuals (having the same time curve of growth), the same type of constitution is induced by the ecological milieu. In the case of "anisodromic" individuals, the same type can be realized only at the time of identical phases of their growth: "Law of Specific Induction" (1928). The author shows the application of this law in autecology and synecology. Every synecological community consists of a number of "ecological patterns." The synecological community is always the active factor and represents the larger whole of which the ecological patterns are the parts.—W. Brandt.

5366. DAUBENMIRE, REXFORD F. Merriam's life zones of North America. *Quart. Rev. Biol.* 13(3): 327-332. 1938.—Forty years ago C. H. Merriam divided North America into 7 life zones. He explained the distribution of these zones on the basis of temp. variations during the period of growth and reproduction. His methods and concepts exerted wide influence and his theory was widely accepted. Recently, however, his work has been much questioned: the boundaries of his zones have had to be altered, the causal factor is not the simple unit factor he supposed, and certain technical errors have had to be corrected.—H. G. Swann.

5367. DICE, LEE R. The Sonoran biotic province. *Ecology* 20(2): 118-129. 1 fig. 1939.—The Sonoran biotic province is distinguished by its assemblage of species and races of plants and of animals. Many of the peculiar Sonoran races and species of amphibians, reptiles, and mammals have probably differentiated in the province, due evidently to the occurrence there of very distant types of environmental conditions combined with a considerable amount of local isolation. The Sonoran biotic province is also distinguished as an important physiographic province, as an important climatic province, and as a vegetation climax.—L. R. Dice.

5368. HALL, T. F. Jr. An ecological study of the cypress-gum community in the Pearl River valley. *Proc. Louisiana Acad. Sci.* 4: 251. 1938.—A fresh-water marsh-successional swamp in southeastern St. Tammany Parish, Louisiana, was investigated. *Nyssa biflora* was found dominant, the subdominants being *N. aquatica* and *Taxodium distichum*. Only 22 trees, shrubs, and vines were encountered within the community. The predominant of the herb understory was *Proserpinaca palustris*. 96 vertebrates were observed.

5369. HOYT, J. C. Drought of 1936, with discussion on the significance of drought in relation to climate. *U. S. Geol. Surv. Water Supply Paper* 820. iv+62p. 2 pl., 18 fig. 1938.—The author discusses the causes (deficient and unsatisfactorily distributed precipitation, accompanied by high temps. and warm winds); the effects on ground and surface water, including the stability of the water supply and the decline of lake levels; damage to vegetation, domes-

tic and industrial water supplies, health, power, navigation, and to recreation and wild life; the question of relief in affected areas; major drought years in humid and semiarid States; droughts as related to the semiarid States; the shelter belt; natural vegetation and soils of the Great Plains in relation to climate; droughts as related to crops and to the classification of climate; and variability of climate and climatic risks. An article entitled Backgrounds of Economic Distress in the Great Plains, by H. L. WALSTER, is appended.—*Courtesy Exp. Sta. Rec.*

5370. JACKS, G. V., and R. O. WHYTE. Erosion and soil conservation. *Herbage Publ. Ser. Bull.* 25. 206p. Imperial Bureau of Pastures and Forage Crops: Aberystwyth, 1938. Also publ. as Tech. Communication 36 from Imperial Bureau Soil Sci.: Harpenden. Pr. 5s.—In compiling this account of contemporary soil erosion, the authors have consulted widely in the literature of the subject, and have had the active cooperation of correspondents and workers throughout the world, and this has enabled them to present a brief but authoritative picture of conditions in the Mediterranean region, U.S.S.R., India, Ceylon, East Indies, China, Japan, French overseas possessions, South Africa, Rhodesia, East Africa, West Africa, U.S.A., Canada, West Indies, Australia, and Fiji. The bulletin contains a mass of information and is well put together, but a useful addition would have been a concluding section summarizing and comparing conditions and developments in the various countries.—*From review by W. B. Brierley (courtesy Ann. Appl. Biol.).*

5371. MADE, A., und W. RUDORF. Zweck und Aufbau moderner bewetterter Gewächshäuser und ihr Temperaturgang im Vergleich mit dem des Freilandes. *Bio-klimatische Beiblätter* 5(4): 145-153. 10 fig. 1938.—An air conditioning plant (Brown, Boveri & Cie.) for regulating temp., humidity and circulation in a greenhouse is described. The purpose of the installation was to keep the temp. below 22° C. Operation was without thermostats. Continuous temp. records were obtained with radiation-protected resistance thermometers. The mean daily temp. amplitude of 9° C in the open was reduced to 4° C in the greenhouse. On days with considerable radiation the temp. could be kept 8 to 10° C below the outdoor value; in a greenhouse without air conditioning under the influence of radiation values of 9° C above the outdoor reading were reached. Radiation intensities of 0.1 gram calory per sq.cm. per min. produce a noticeable increase of temp. in a non-conditioned greenhouse. The vertical temp. gradient in the conditioned greenhouse is reversed (cool near floor, warm near roof) compared to the daytime situation outside. The cooling mechanism consisted of a well with a rotary pump which delivered 35 cu.m. of water per hour with a temp. of 9.5 to 10° C. This water is circulated through lamellated radiator pipes in the greenhouses and can be heated electrically to the desired temp. Nothing is said about the size of the greenhouses.—H. Landsberg.

5372. NORTON, EDNA M., and EVA OXFORD GERSBACHER. Stump vegetation at Reelfoot Lake. *Jour. Tenn. Acad. Sci.* 14(1): 181-185. 2 fig. 1939.—A description, check

list, and illustrations are given of the vegetation growing in the *Taxodium distichum* stumps in Reelfoot Lake, an earthquake lake. Drawings are shown of the root growth of the plants as found in the stumps. The agencies concerned in transporting plants to this habitat are briefly discussed.—*E. O. Gersbacher.*

ANIMAL

5373. BALOGH, J. Vorarbeiten zu einer quantitativen Auslesemethode für die bodenbewohnenden Gliedertiere. *Zool. Anz.* 123(3): 60-64. 1 fig. 1938.—The catch preserved in alcohol is placed in a glass tube having a constriction above and mixed with saturated NaCl soln. Dirt and detritus settle to the bottom and the animals come to the top and by means of a cork mounted on a wire are drawn above the constriction where they can be measured. The bottom material is treated twice more in the same way and this suffices to recover practically all of the arthropods in the sample.—*L. H. Hyman.*

5374. DARLINGTON, P. J. Jr. The origin of the fauna of the Greater Antilles, with discussion of dispersal of animals over water and through the air. *Quart. Rev. Biol.* 13(3): 274-300. 1938.—The region from which most of the fauna of the Greater Antilles appear to have been derived is Central America, and many have favored the view that there was once a land bridge between these two regions over which the animals migrated. But this paper holds that such an hypothesis is unsatisfactory on several counts. Both geological and zoogeographical evidence for it are poor. An alternative hypothesis is suggested that the organisms crossed a water gap, perhaps from Honduras to Jamaica. The chances of dispersal of organisms across water gaps are discussed, partly mathematically, with the conclusion that such dispersals appear reasonably orderly. Wind storms play an important part in such dispersals. The fauna of the Greater Antilles is moderately homogeneous but it is very orderly; the latter appears due to the fact that the animals are still distributed along the migration routes. The fauna also is irregularly depauperate and shows various characteristics of an oceanic fauna.—*H. G. Swann.*

5375. ERRINGTON, PAUL L. Reactions of muskrat populations to drought. *Ecology* 20(2): 168-186. 1939.—Varying periods of drought from 1934 to 1938 provided exceptional opportunities to study muskrat (*Ondatra zibethica*) populations living under emergency conditions especially in central and northwestern Iowa. Although the animals showed considerable tolerance to adverse changes in habitat and to some extent modified their living routines accordingly, their behavior remained basically rather stereotyped. A large proportion of the muskrats resident in drying marshes and streams tended to stay in familiar home ranges and, while they sometimes suffered heavy or even annihilative mortality, were usually more fortunate than the individuals that attempted to go elsewhere. As vicissitudes became intensified, there was a conspicuous increase of intraspecific strife, vulnerability to predation (notably by mink), random and often lethal wandering, and, in winter, losses from hunger and cold.—*P. L. Errington.*

5376. PEARSE, A. S. Animal ecology. 2nd ed. xii + 642p. 133 fig. McGraw-Hill Book Co., Inc.: New York, 1939. Pr. \$5.50.—There has been an active advance in ecology in general and apparently also in the author's knowledge of the subject since the first edition of this book appeared in 1926. The present completely revised edition continues to discuss all phases of animal ecology with constant reference to the newer literature. As the preface states, "New chapters include information on climate, evolution, chronology, succession, climaxes, rhythms, communities, competition, populations, teaching ecological problems, and economic ecology. 132 illustrations have been added." The text abounds in literature citations and the skeletonized bibliography fills 65pp.—*W. C. Allee.*

5377. PENNEBAKER, F. Notes on tree-hole inhabitants of the New Orleans area. *Proc. Louisiana Acad. Sci.* 4: 250-251. 1938.—An examination of tree-holes in New Orleans revealed the presence of animal communities in which protozoans, rotifers, crustaceans, water-mites, and larvae of mosquitoes, midges, drone-flies and beetles are represented. Special attention to mosquitoes disclosed 6 spp. on which habit-notes are also presented: *Aedes tri-*

seriatus, *A. aegypti*, *Culex quinquefasciatus*, *Megarhinus portoricensis*, *Orthopodomyia signifer*, and *O. alba*.

5377A. VAN DEVENTER, W. C. Studies on the ecology of secondary communities in a deciduous forest area. *Ecology* 20(2): 198-216. 5 fig. 1939.—The secondary community types developing as a result of prolonged human activity in a deciduous forest area may be classified with reference to stability, position and amount of tree and shrub reproduction. Two principal types are recognized: perennial communities, including pastures, field borders, uncultivated orchards, meadows and dwelling environs, and subperennial communities, including all types of cultivated fields. The communities of the dwelling environs and cultivated fields are essentially insular in nature. The species comprising the winter resident and summer resident bird populations develop centers of activity in particular community types. Most species center their activity in the types most closely resembling the primitive communities to which they originally belonged. However, changes in habitat preference on the part of a few man-tolerant species, together with the migration of former prairie species into the more open community types and the introduction of exotics have brought about the development of a bird fauna of mixed origin.—*W. C. Van Deventer.*

5378. WOOSTER, L. D. An attempt at an ecological evaluation of predators on a mixed prairie area in western Kansas. *Trans. Kansas Acad. Sci.* 41: 387-394. 1938.—The evaluation of certain animals in terms of their importance to the general animal community on a mixed-prairie area in mid-western Kansas. The marsh hawk with a score (grams of food per day per species) of 611 is the most important predator on mixed prairie. Then follow the coyote with 381, Swainson hawk 226, Archibuteos 22 and all other hawks and owls 27. The marsh hawks on a square mile require 16 mice per day or 5840 per year. The coyotes on one square mile (one half an animal), if they ate nothing but jackrabbits, would require 45 per year. To supply the annual needs of all dominant predators on one square mile of mixed-prairie would require, for example, 150 jackrabbits, or 12,000 meadow mice, or 50,000 harvest mice.—*F. C. Gates.*

PLANT

5379. BIRAND, HIKMET AHMET. Untersuchungen zur Wasserökologie der Steppenpflanzen bei Ankara. *Jahrb. Wiss. Bot.* 87(1): 93-172. 1938.—The author analyzed the habitat conditions for these Anatolian plants. The precipitation in different years varied widely. High temp. coinciding with period of drought results in relative humidity, and evaporation conditions that are equivalent to desert conditions in the dry season. The osmotic values of a series of Anatolian steppe plants were investigated. Plants which develop their foliage in the spring months of relatively high precipitation, as geophytes and ephemerals, have a low and not markedly varying osmotic value; their summer rest is not imposed upon them by the habitat but detd. by heredity. Plants which vegetate throughout the summer are from both morphological and physiological standpoints very dissimilar and behave differently to prolonged drought. 7 ecological groups were thus distinguished on leaf anatomy and root characters and on their osmotic behavior and powers of drought resistance.—*J. Priestley.*

5380. FOUILLOY, R. La végétation de quelques mares nivernaises. *Bull. Soc. Bot. France* 84(7/8): 494-499. 2 fig. 1937.—A succession of plant communities of remarkable distinctness in space, which does not seem to correspond to the same succession in time.

5381. HODGMAN, MARGARET ELIZABETH. The hydrogen-ion concentration of the soil in relation to flora at Squire Valleevue Farm. *Ohio Jour. Sci.* 39(1): 15-24. 1 pl., 2 fig. 1939.—Soil reaction in an uncultivated area in Cuyahoga County, Ohio, showed variation with organic content, moisture content, and plant cover. The area had a pH range of 3.7 to 7. The majority of plants showed a fairly wide range of soil reaction tolerance and a more limited optimum range. The herbaceous plants appeared to be somewhat more sensitive to soil acidity than the trees as a group. Of the microflora, the molds were more acid tolerant than the bacteria in soil with a pH less than 4.—*M. E. Hodgman.*

5382. KÖIE, MOGENS. The soil vegetation of the Danish conifer plantations and its ecology. *K. Danske Vidensk. Selsk. Skrifter Nat. og Math. Afd. Ser. 9* 7(2): 1-86. 2 pl., 9 fig. 1938.—About 250 analyses of the ground vegetation of the Danish conifer plantations were made according to Raunkiaer's methods, each comprising 20 samples. Vascular plants as well as mosses and lichens were investigated. In connection with each analysis measurements of light intensities were made with Wiesner's hand insulator according to the method devised by Boysen Jensen, also, 3 measurements of the pH of the surface soil and of the thickness of the raw humus layer. The data of the character, age, and generation of the trees and of the nature of the subsoil are given in 17 tables. The vegetation is divided into about 35 plant sociations, mostly growing in raw humus. After a description of the sociations, a number of examples are given of the distribution of the ground vegetation on different soils according to conditions of light, exposure to sun and wind, height above the ground-water, pH, etc., and of the succession after different soils have been planted with conifers. The limits of light for the most important plant sociations are given. It proved that no difference in the vegetation was observable under *Pinus silvestris*, *P. montana*, and *Picea excelsa* under uniform edaphic and climatic conditions, whereas there was a considerable difference in ground flora found under *Abies pectinata*. As might be expected, humidity is one of the most important ecological factors in coniferous woods, and the distribution of the vegetation is alike no matter whether the different humidity is due to the porosity of the soil, to the sun, or to the wind. Two of the moss plant sociations are apparently distributed chiefly according to the thickness of the raw humus layer, and within fairly narrow limits this thickness is characteristic of the different plant sociations. It is demonstrated that the pH-demands differ even within extremely acidiphilous species, and that accordingly this factor is of importance. It seems that some plants only occur in conifer woods when the raw humus layer attains rather considerable thicknesses due to their special demand for pH.—*M. Köie*.

5383. LINDQUIST, B. Timmesøbjerg en biologisk studie i bokskogen på møens klint. [Timmesøbjerg:—A biological study in a beech forest on Møens Klint.] *K. Danske Vidensk. Selsk. Skrifter Nat. og Math. Afd. Ser. 9* 7(4): 1-59. 19 pl. 1938.—This intensive biological study was conducted over a period of 7 years on a lightly-cut 30 × 40 m. area within an all-aged, unmanaged beech forest in Denmark. Trees varied in age from 50 to 300 years. Because of the combined effects of extremely slow growth and severe wind damage, the trees had poor form. Several unique humus forms were found within the stand and described. The dominant plant association was *Anemone hepatica*—*Carex digitata*, although many others were present. Using the point method and the Hult-Sernander method, vegetation was correlated with (1) "filtforna" (or duff), humus, and mull types; (2) soil type; and (3) soil physical and chemical analysis.—*C. F. Olsen*.

5384. NORDHAGEN, ROLF. Versuch einer neuen Einteilung der subalpinen-alpinen Vegetation Norwegens. *Bergens Mus. Arbok Naturvidenskapelig Rekke* 1936(2, paper 7): 1-88. 1937.—Scandinavian phytosociologists ("the Uppsala school") have been reproved for having divided vegetation into such small units that it is impossible to make a synoptic arrangement. This is clearly disproved by Nordhagen's paper, in which the whole material of Scandinavian phytosociological research in alpine and sub-alpine regions during the last 25 yrs. is summarized into 19 orders, comprising 1 or more alliances. Many orders and alliances are common to Northern and Middle Europe. This paper marks a very important event in phytosociological research, viz. the successful attempt to correlate the results of the Uppsala and the Zürich-Montpellier schools of phytosociological research on a common basis. Details must be sought in the original paper. Important chapters are those dealing with the bog communities, divided in Scheuchzeretalia palustris (oligotrophous) and Caricetalia goodenowii (mesoeutrophous). Other groups to be mentioned are the chionophilous orders Arabidetalia coeruleae (on limestone soil) and Salicetalia herbaceae, and the

alpine heaths, Rhodoretalia ferruginei. Many statistical tables are included.—*K. Faegri*.

5385. PIEMEISEL, R. L. Changes in weedy plant cover on cleared sagebrush land and their probable causes. *U. S. Dept. Agric. Tech. Bull.* 654. 1-44. 7 fig. 1938.—The successive weedy plant covers recorded (1928-1935) on several newly abandoned fields in southern Idaho were, first, Russian thistle (*Salsola pestifer*); then mustards, either flixweed (*Sophia parviflora*) or tumblemustard (*Norta altissima*); and next, downy chess (*Bromus tectorum*). Under favorable conditions flixweed supplanted Russian thistle the 3d season, and downy chess supplanted flixweed the 5th. Russian thistle forms the first cover because of its efficient seed distribution but it fails to continue to hold the ground as a dominant. Downy chess and flixweed have the advantage over Russian thistle usually of prior germination and always of prior maturity. The first 2 have first chance at the water supply and fulfill their needs for growth and seed production before Russian thistle is well started. Downy chess has the greatest advantage in this respect, since it matures the earliest. In dense mixed stands where Russian thistle is the dominant, individuals of flixweed or of downy chess may thrive and produce seed when Russian thistle fails. The numbers of plants per unit area of Russian thistle and of the mustards may become so high and the individuals so crowded that they fail to produce seed. Thus the numbers of plants per unit area rather than "drought" determine the changes in plant cover though low precipitation accentuates the effect of crowding. The capacity of a species to withstand crowding and the chances for its continuance as a dominant are illustrated by means of counts made on a sq. m. in one of the plots. The degree of crowding can be expressed in terms of soil space, in sq. cm. per plant, based on the number of plants per unit area and the figure can then be corrected for precipitation. In this way a survival index for the species for a given soil and precipitation is arrived at. The capacity of Russian thistle to withstand crowding is least and flixweed is next. The changes in the weedy plant cover are of importance because Russian thistle and the mustards are breeding hosts of the beet leaf-hopper (*Eutettix tenellus*), vector of the virus disease (curly top) of sugar beets. Downy chess is not a breeding host. Destructive agencies such as excessive grazing and burning may either destroy a downy chess cover or prevent its development. A Russian thistle cover may persist year after year as it does in fields excessively grazed by enclosed stock.—*R. L. Piemeisel*.

5386. SCHMID, EMIL. Contribution to the knowledge of flora and vegetation in the Central Himalayas. *Jour. Indian Bot. Soc.* 17(4): 269-278. 1938.—The geological expedition of Heim and Gansser (1936) to the Middle Himalayas collected plants and recorded observations on the alpine and sub-alpine zones of this region. Study of their notes and of the some 200 specimens collected yielded an outline of the relations of this flora to the corresponding vegetational units in Eurasia. A comparison of the sub-alpine forest belt (Larch-*Pinus cembra*), the *Pulsatilla*-forest-steppe belt, the alpine dwarf shrub-tundra, the *Carex-Elyna* belt, the *Stipa*-steppe belt is made and the genetic conditions of these communities are discussed.—*E. Schmid*.

5387. SILVEIRA, FERNANDO. Mangrove. *Rodriguésia* [Rio de Janeiro] 3(10): 131-154. 4 pl. 1937.—From a study of the literature the author concludes that the mangrove community, wherever found, is essentially similar, consisting of plants of the same families and genera, with few exceptions. A list of the species of mangrove of Brazil, with local common names, is given.—*H. Wilkens*.

5389. WILKINS, W. H., and SHEILA H. M. PATRICK. The ecology of the larger fungi. III. Constancy and frequency of grassland species with special reference to soil types. *Ann. Appl. Biol.* 26(1): 25-46. 1939.—An examination, during a period of 2 years, of 20 grassland stations comprising the 3 soil types chalk, clay and sand showed that the total number of fungal species in 1936 was 147 and in 1937 it was 125. Of these, 100 spp. were common so that there was considerable similarity in the fungus floras of the 2 years. Comparison with previous work oak woods and beech woods indicated that grassland typically fewer spp. than woodland, moreover the

istic spp. are quite different. In relation to soil types the number of spp. was greatest on chalk, rather less on sand and about half on clay. The degrees of species constancy is highest on sand where it is twice that on either chalk or clay. There is no definite correlation between constancy of spp. and frequency of individuals, but in general spp. with high constancy values had also high frequency values. Sandy soil had the largest number of individuals viz. 40,000, chalk having 10,000 and clay 5,000. Certain spp. of fungi appear to be equally tolerant of all 3 kinds of soil and more or less equally frequent on each type; a very few spp. are exclusive to one type of soil. Most of the spp. while constantly found on all types of soil, indicate by their frequency values a definite preference. Lists of typical grassland fungi, and of fungi characteristic of each of the 3 soil types, are given with, in each case, some estimation of relative abundance.—*W. H. Wilkins.*

OCEANOGRAPHY

(See also in this issue Entry 6764)

5390. HENTSCHEL, E. Über quantitative Seihmethoden in der Planktonforschung. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 13(3): 304-308. 1938.—Steemann Nielsen's objections to the use of samples taken by net or other forms of strainer, for quantitative estimation of phytoplankton, are upheld; his criticism springs from an erroneous conception of the aim of these methods.—*E. Hentschel.*

5391. LUCAS, C. E. Some aspects of integration in plankton communities. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 13(3): 309-322. 1938.—A number of expts. and observations made in various fields and dealing with various groups of organisms are reviewed in the light of their application to ecological problems. All were concerned with the growth in association of different numbers of organisms, of the same and different spp.; all showed, under natural conditions and in the laboratory, definite modifications of the lives of the organisms (or parts of them) by their varying organic surroundings (the varying numbers of the rest of the community). While feeding in the usual sense of the term may have been partly concerned in some of the relationships, in many it is clear that other biol. processes are involved, and much of the evidence points to the production of secretions and excretions which may have intra- and interspecific effects: other factors are discussed. The relevance of such processes to ecology is pointed out and some examples are discussed in relation to pelagic ecology. In particular, it is suggested that "non-predatory" relationships of this type may lead to a biological conditioning of the water and play a significant part in general growth, succession, "animal exclusion," and in processes of growth within and at the junction of water masses of different origin.—*C. E. Lucas.*

5392. REDFIELD, ALFRED C. The history of a population of *Limacina retroversa* during its drift across the Gulf of Maine. *Biol. Bull.* 76(1): 26-47. 2 fig. 1939.—A population of small specimens of this pteropod appeared in the eastern part of the Gulf of Maine in Dec., 1933. From collections made during the following 9 months information was obtained showing that the population was homogeneous, that its members grew to maximum size in 5 months, declining in numbers as they did so. A 2d population of small individuals appeared in the Gulf in late spring, originating chiefly from offshore, but possibly in part being offspring of the original population. These were unsuccessful in maintaining their numbers throughout the summer. In addition to the information on the life history of *Limacina*, the data indicate the rate of drift of the water in its circuit of the Gulf. It supplies also suggestive information on the dispersal of organisms through the lateral mixing of water. It emphasizes the dependence of pelagic organisms upon the current systems of the ocean and the difficulty involved in maintaining a permanent population in any one locality.—*A. C. Redfield.*

5393. WIMPENNY, R. S. Diurnal variation in the feeding and breeding of zooplankton related to the numerical balance of the zoo-phytoplankton community. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 13(3): 323-337. 3 fig. 1938.—It is suggested that, at certain stages in the mutual relations of zooplankton and phytoplankton com-

munities, there is a greater assimilation by night and reproduction by day in the zooplankton. This is the opposite of the greater vegetative reproduction as shown by the more numerous dividing stages in the phytoplankton at night and the assimilation by day. Considering only the populations sampled by coarse silk nets, the proportion of food containing copepods appears to be a rough index of the zooplankton ratio.—*R. S. Wimpenny.*

LIMNOLOGY

(See also in this issue Entries 6764, 6836)

5394. BAAS BECKING, L. G. M. On the cause of the high acidity in natural waters, especially in brines. *K. Akad. Wetenschap. Amsterdam Proc. Sect. Sci.* 41(10): 1074-1075. 1938.—Several salt lakes and volcanic lakes of high acidity were investigated in Australia and the Dutch E. Indies. In a volcanic lake the acidity was caused by volcanic H_2SO_4 . In other lakes the acidity was caused by oxidation of sulphites, a process which at least is partly due to the action of bacteria.—*J. van Overbeek.*

5395. CHANDLER, DAVID C. Plankton entering the Huron River from Portage and Base Line Lakes, Michigan. *Trans. Amer. Microsc. Soc.* 58(1): 24-41. 1939.—Portage and Base Line Lakes, located 0.2 mile apart, are similar in physical and chemical conditions. Their outlets unite to form a portion of the Huron River. From Oct., 1931, to Mar., 1933, a study of the net plankton of the 2 outlets showed a marked similarity in respect to quality, quantity and seasonal variation. The 131 plankters identified were common to both outlets and were distributed as follows: Myxophyceae 12, Bacillariales 31, Chlorophyceae 19, Protozoa 20, Rotifera 34, and Crustacea 15. An 11-months' study designed to compare the plankton of Base Line Lake with that of its outlet revealed that plankton leaving the lake was qualitatively representative of that in the lake proper, but the quantity of plankton per liter in the lake proper was several times greater than that in the outlet.—*D. C. Chandler.*

5396. KUHNE, EUGENE R. Preliminary report on the productivity of some Tennessee waters. *Jour. Tenn. Acad. Sci.* 14(1): 54-60. 1939.

5397. MORTIMER, C. H. A discussion on freshwater biology and its applications. II. Physical and chemical aspects of organic production in lakes. *Ann. Appl. Biol.* 26(1): 167-172. 1939.—The potential production of algae in a lake is limited by temp., light, and the rate of supply of certain nutrient substances, notably nitrates and phosphates, to the water from the mud and the drainage basin. Thermal stratification of lake water in summer and mixing in winter impose a seasonal rhythm on production. Methods of measuring production and the value of chemical data in forecasting production in large bodies of water are discussed. Although the fish production in measured carp ponds is about the same (190 lbs. per acre) as meat production on good pasture, fish production in natural waters falls far below this figure.—*C. H. Mortimer.*

5398. ROSENBERG, MARIE. A discussion on freshwater biology and its applications. III. Algal physiology and organic production. *Ann. Appl. Biol.* 26(1): 172-174. 1939.—A short survey is given of processes relating to production in a lake, and the annual periodicity of plankton-algae in Windermere is outlined. Some routine physical and chemical observations are descr., and the results obtained are correlated with biological results. Stress is laid upon the necessity of investigating the physiology of plankton algae in the laboratory to test conclusions drawn from parallel biological, physical and chemical observations in the field. A better understanding of the complicated interaction of factors can only be expected from a closer collaboration between ecology and experimental work.—*M. Rosenberg.*

5399. WORTHINGTON, E. B. Freshwater biology and its applications: Introduction. *Ann. Appl. Biol.* 26(1): 165-167. 1939.—Research on the productivity of water is far behind that of the land, but as factors are elucidated they can be applied for purposes of increasing productivity (for fisheries) or reducing it (for water-supply). The principle of change in environments caused by physical and biological processes is of great importance, for it

appears that some reservoirs have changed (towards greater productivity) more in 50 years than some natural lakes have in 15,000 years. Means of retaining the status quo by cropping water is essential in order to keep reservoirs in good condition.—E. B. Worthington.

WILDLIFE MANAGEMENT—AQUATIC

(See also the section "Pisces"; and Entries 5397, 5399, 6259, 6823, 6827)

5400. CLEMENS, W. A., D. S. RAWSON, and J. L. McHUGH. A biological survey of Okanagan Lake, British Columbia. *Fish. Res. Canada Bull.* 56. 1-70. 2 fig. 1939.—Okanagan lake in southern British Columbia is 67 miles long and has an average width of about 2 miles. The observed maximum depth is 670 feet. Morphometry, temp., O_2 and nitrogen analyses indicate it as an extremely oligotrophic type. The net plankton of the open water is small in amount and the macroscopic bottom organisms are scanty. The lake supports a considerable number of fishes of which the Kamloops trout (*Salmo gairdneri kamloops*) is the most important because of its value as a sport fish. The Eastern whitefish (*Coregonus clupeaformis*) has been introduced and become established but not in sufficient numbers to support a commercial fishery. The so-called coarse fishes (suckers and minnows) of the shallow waters are abundant and present an important problem in respect to utilization.—Auth. summ.

5401. ESCHMEYER, R. W., and O. H. CLARK. Analysis of the populations of fish in the waters of the Mason Game Farm, Mason, Michigan. *Ecology* 20(2): 272-286. 7 fig. 1939.—Studies were made in two streams and the $8\frac{1}{2}$ acre pond formed by impounding their waters. After the first derrick root poisoning 13 species,* weight 166.2 pounds per acre, were taken from the larger, slower, warmer, partly open stream. A third of the fish were creek chubs with Johnny darters next in numbers. At the second poisoning 40 days later creek chubs and mud minnows had repopulated the area to a much greater extent than had other species. In the relatively rapid, vegetationless, shaded, smaller stream, 7 species, weight 65.9 pounds per acre, were taken, mainly creek chubs and mud minnows, the black-nosed dace and Johnny darters being about 10%. Forty days later 80% of the fish were creek chubs as compared with 42.5% in the first study, and 8.4% were mud minnows. Larger fish appeared to migrate more than smaller ones. Blunt-nosed minnows showed decided preference for the larger stream. A 20-gallon sample of fish from the pond yielded 12 species; only black crappies and long-eared sunfish were found exclusively in the pond. More than one-half the fish were blunt-nosed minnows. White suckers and goldfish showed preference for the pond. There were few game fish and the too-abundant populations of suckers, goldfish and sunfish were stunted. Impoundment apparently increases the yield of forage fish. Open streams were more productive of forage fish than shaded areas. Valued at one cent per fish of bait species, the standing crop in the larger stream was worth \$192 per acre; in the smaller, \$95 per acre.—O. H. Clark.

* Creek chubs (*Semotilus atromaculatus atromaculatus*); Johnny darters (*Boleosoma nigrum nigrum*); Blunt-nosed minnows (*Hyborhynchus notatus*); Mud minnows (*Umbra limi*); Black-nosed dace (*Rhinichthys atratulus meleagris*); Black crappies (*Pomoxis sparoides*); Long-eared sunfish (*Xenotis megalotis peltastes*); White suckers (*Catostomus commersonnii commersonnii*); Goldfish (*Carassius auratus*).

5402. FOERSTER, R. E. An investigation of the relative efficiencies of natural and artificial propagation of sockeye salmon (*Oncorhynchus nerka*) at Cultus Lake, British Columbia. *Jour. Fish. Res. Bd. Canada* 4(3): 151-161. 1938.—From 3 tests each of natural propagation and of artificial propagation involving liberation of free-swimming fry and 2 tests of artificial propagation involving planting of eyed eggs, it was found that no statistically significant difference occurred between the 3 methods. Computing the percentage efficiency as the number of seaward migrants produced from the total eggs handled, natural propagation varied from 1.05% to 3.23%—an average of 1.80%; fry liberation from 2.42% to 4.54%—an average of 3.24%; and egg planting from 1.45% to 4.71%—an average of 3.03%.

Losses occurring during the 5 years' stripping and hatchery operations were recorded and, based on total eggs, the hatchery product available for distribution represented from 61.0% to 86.0% for egg planting and from 63.4% to 78.5% for fry liberation. There occurred a lake mortality of approx. 96% of the number of fry liberated. The conclusion was reached that in an area such as Cultus lake, where a natural run of sockeye occurred with a reasonable expectancy of successful spawning, artificial propagation, as commonly practised, provided no advantage over natural spawning, as a means of maintaining the run.—Auth. abst.

5403. FOERSTER, R. E. Mortality trend among young sockeye salmon (*Oncorhynchus nerka*) during various stages of lake residence. *Jour. Fish. Res. Bd. Canada* 4(3): 184-191. 1938.—Young sockeye salmon, marked and liberated into Cultus lake, B.C., at intervals during the year were counted as seaward migrants. A linear relationship between time in the lake and % survival was found for periods of from 9.5 to 3.5 months, and from this the trend in percentage loss is computed. Mortality is heavy during the first few months—approx. 65.4% in the first 2.5 months—decreasing as the year advances.—Auth. abst.

5404. GRAHAM, MICHAEL. Growth of cod in the North Sea and use of the information. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 108(1): 57-66. 2 fig. 1938.—If the stock be in equilibrium with fishing so that, excluding fluctuations, the numbers have no tendency to increase, decrease or alter in relative proportion, the total contribution of growth to the stock in g. per annum is given by NWG . N is number of fish; W , weight; and G , weighted average growth rate derived from $(\log w_2 - \log w_1)$

NWG is estimated for different states of equilibrium between the stock of cod and fishing by trawlers from Grimsby.—F. N. Clark.

5405. MEYER, PAUL-FRIEDRICH. Drepanopsetta-Besiedlung der westlichen Ostsee. Eine Folge von Larvenverfrachtungen im Jahr 1930. *Cons. Perm. Internat. Explor. Mer. Rapp. et Procès-Verbaux Réunions* 102(5): 1-7. 1937.—The long rough dab, a frequent visitor to the west Baltic, has been taken in depths greater than 20 m. Whether depth or bottom and food conditions is the limiting factor is not known. The greatest number of dabs were found on smooth bottom heavily populated with *Ophiura albida*. In some months of 1932 and 1933 the catch of *Drepanopsetta* equalled or exceeded the catch of the dab, *Pleuronectes limanda*. In 1934 the catch of long rough dab was slightly larger. This unusual abundance of *Drepanopsetta* is probably caused by the incoming of eggs or young stages. Seventy to 80% of the 1933 and 1934 landings were composed of the 1930 year-class. The early stages of this year-class may have been brought into the Baltic by the large influx of North Sea and Atlantic water reported in the spring and summer of 1930. The failure to find eggs, larvae or ripe individuals in the west Baltic indicates that the adults move out of this region when maturity is attained. In 1936 the 1929 year-class had disappeared from the catch, the 1930 group was much reduced in numbers, and the 1934 year-class dominated. Meanwhile the total catch decreased. This decrease is not attributed to overfishing but to the outward migration of mature fish.—F. N. Clark and P. M. Roedel.

5406. RICKER, W. E. "Residual" and kokanee salmon in Cultus lake. *Jour. Fish. Res. Bd. Canada* 4(3): 192-218. 1938.—The sockeye salmon in Cultus lake are of 3 kinds: the normal anadromous stock; a "residual" group, not anadromous, but largely or perhaps wholly the progeny of anadromous fish; and a stock of non-anadromous kokanee, which have no known connection with the anadromous or residual fish at the present time. Morphological and physiological peculiarities distinguish the 3 kinds at maturity. In the segregation of the progeny of a spawning of anadromous fish into migrant and residual groups, rate of growth and sex play a determining rôle.—Auth. abst.

5407. SCHAEFER, MILNER B. Preliminary observations on the reproduction of the Japanese common oyster, *Ostrea gigas*, in Quilcene Bay, Washington. *Biol. Repts. Washington State Dept. Fisheries* 36E. 1-36. 1 fig. 1938.—

O. gigas, introduced from Japan, reproduce naturally in a few limited localities in Washington. Studies of the reproductive activities and associated ecological factors were instituted in 1936 at Quilcene Bay, a locality which gives promise of having a regular spat fall. Hydrographic records included temp., salinity and pH throughout most of the year. In 1936, spawning commenced before July 1 and continued until the middle of Sept., taking place principally between July 28 and Aug. 12. It occurred at temps. considerably lower than those recorded by previous investigators as critical temps. for the spawning of this species. The rate of larval development, studied by means of occurrence of size groups of larvae in the plankton, appears to be directly correlated with the water temp. Most larvae developing late in the season perished before setting size was reached, apparently as the result of water temp. below the minimum for larval development. Larvae were found to set when about 270 μ in height, from the early part of July until early Oct., with most of the setting taking place in Aug. Large variations in amount of setting at different localities are recorded. The setting was correlated with the lunar tidal period, being most intense during neap tide periods and least intense during spring tide periods; this periodicity is not due to periodic variations in temp., salinity, pH or rate of spawning. The number of larvae setting on glass plates and concrete-coated cardboard spat collectors was found to be a function of the angle of the surface of attachment; the largest number of larvae attach to under horizontal surfaces, the number decreasing as the angle with the under horizontal becomes greater.—*L. A. Royal*.

5408. SCHOFFMAN, ROBERT J. Age and growth of the red-eared sunfish in Reelfoot Lake. *Jour. Tenn. Acad. Sci.* 14(1): 61-71. 1 fig. 1939, also in: Report of Reelfoot Lake Biological Station, 3: 61-71. 1939.—Age detns. of 563 red-eared sunfish, *Eupomotis microlophus*, were made by examining the scales for the presence of annular rings. The scales were examined by a modification of the method of Schoffman (1938). The modification consisted of the construction of a new type of polariscope using polaroids to obtain polarized light. Sex determinations of the red-eared sunfish revealed no apparent difference in their growth, both reaching legal length (6 inches) in their 3d summer of life. The ♂♂ attained the greatest weight for length during the 4th summer and the ♀♀ during the 5th summer of life.—*R. J. Schoffman*.

5409. WALES, J. H., and RICHARD BLISS. Progress report of trout feeding experiments, 1936. *California Fish and Game* 23(2): 138-143. 1937.—Dehydrated beef meal proved an excellent fresh meat substitute for Brook trout (*Salvelinus fontinalis*). Trout weighing 25 per oz. or more may be fed dry meals combined in pellet form twice a day and fresh liver once a day with better results than when the meals are mixed with meat in non-pellet form. No correlation was found between diets containing various combinations of liver, salmon egg, dry milk, beef meal and salmon meal and the severity of furunculosis.—*J. H. Wales*.

5410. WALFORD, LIONEL A. Effect of currents on distribution and survival of the eggs and larvae of the haddock (*Melanogrammus aeglefinus*) on Georges Bank. *Bull. U. S. Bur. Fish.* 49(29): 1-73. 29 fig. 1938.—The aims of this study were to chart the spawning grounds of the American haddock on Georges Bank (situated to the S and E of Cape Cod) in 1931 and 1932; to trace the drift of the eggs and larvae; to find whether Georges Bank was supplied with young haddock from other breeding grounds; and to learn the effect on the brood of changes in the direction of drift. These purposes were met by a study of the vertical and horizontal distribution of different ages of eggs and larvae. Although spawning of the haddock may occur over the whole of Georges Bank, it tends to be concentrated in certain definite areas. It is probable that the eastern part of the bank may normally be such an area, and that other regions, for example, the South Channel or the southern part of the bank, may or may not become important breeding grounds during any year. At spawning, haddock eggs seem to adopt the sp. gr. of the water into which they are deposited, and in general, to remain suspended in the same stratum until hatched. Thus the origin of eggs in late stages of development could be traced by

following the strata in which they were found to wherever such water touched bottom, where haddock spawn. In Mar., 1931, the eggs were spawned mostly on the eastern and southeastern parts of the bank. Since the water there exhibited no directional drift, the eggs remained on the spawning grounds throughout development. In Apr., 1931, spawning continued in the same grounds on a smaller scale; and the eggs were carried southwest by a current which moved toward Nantucket Shoals around the southern edge of the bank. Some of these eggs evidently drifted into the region of Georges Shoals. By the end of May, 1931, spawning had practically ceased on the bank. Georges Bank seems to have supplied its own brood during the 1931 spawning season, receiving no recruits of young from outside breeding grounds. In Apr., 1932, spawning occurred on the eastern part of the bank and in the South Channel. Although there was at that time a southwest drift comparable to that of the previous year, there were also evidently important drifts southward and northward off the edge of the bank, which seem to have carried significant quantities of eggs away. The resulting loss of young evidently seriously affected the success of the 1932 year brood, which appears to have been a relatively small one. There was no evidence that young haddock emigrated from other breeding grounds in 1932. Thus, it was found that the bank supplied its own stock and that changes in drift were responsible for fluctuations in the success of year classes.—*L. A. Walford*.

5411. WILDING, J. L. The oxygen threshold for three species of fish. *Ecology* 20(2): 253-263. 4 fig. 1939.—A total of 678 fish was used to determine the asphyxial oxygen concentration for three species of fish, the yellow perch (*Perca flavescens* Mit), the steel-colored shiner (*Notropis whipplei* Gir.), and the blunt-nosed minnow (*Hyborthynus notatus* Raf.). Two methods were used; in the first, the fish reduced the oxygen concentration of the water by their respiration, and in the second, water having a low oxygen content was run through closed flasks containing fish. The time required to reduce the oxygen value of the water to an asphyxial concentration differed considerably in the two methods; however, the asphyxial oxygen value was found to be approximately the same regardless of the duration of the experiment. Fish were capable of reducing the oxygen to a lower concentration when the temperature was reduced, but the carbon dioxide content and the range of pH had no apparent effect upon the asphyxial oxygen concentration. A large amount of individual variation was encountered in each species of fish although they were of a similar size and under the same experimental conditions. The minimum amount of dissolved oxygen tolerated by the yellow perch, steel-colored shiner, and blunt-nosed minnow was found to be 2.25 p.p.m. at a temperature range of 20° to 26°C.—*J. L. Wilding*.

5412. WIMPENNY, R. S. A routine method for the estimation of fat in plankton and its application to herring tissues. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 13(3): 338-348. 5 fig. 1938.—A routine method for determining the fat-content of plankton samples is described. It consists of extraction in glass tubes plugged with glass wool. The method has also been applied to herring tissues, but is not valid for the high values found at certain times in muscle fat. The mean of 6 plankton samples taken off the Yorkshire coast with a Hensen net for the year 1935 is compared with the mean of detns. on 10 herrings for the period May-Sept. at Shields, and Oct. and Nov. at Lowestoft. The plankton maximum occurred in Aug.; that for the herring, in July. The individual fat content for herring muscle, collected off East Anglia in 1934, 1935 and 1936, showed a tendency to approximate at the time of the New Moon. The gonads of the East Anglian Autumn herring increase their fat-content, while that of the liver falls, as the fishery proceeds.—*R. S. Wimpenny*.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 6206, 6249, 7037)

5413. AUSTIN, OLIVER L. Some results from adult Tern trapping in the Cape Cod colonies. *Bird-Banding* 9 (1): 12-25. 1938.—Adult Terns are caught in the colonies by nest-trapping. The presence of unpaired birds is indicated by the taking of 3 birds on a single nest. The

colonies (3 from 20,000 to 40,000; 6 or 7 between 200-2000, each) are composed of *Sterna hirundo*, *S. dougalli*, and about 400 *S. paradisaea* in all. In 1937, the 10th year of the study, 43.95% of the birds trapped had been banded in previous years. Data indicate that Terns do not begin active reproduction until their 3d year, attain maximum fertility in the 4th, retain fecundity for 3 years, then decline, until, at about 10 years, they are not reproducing effectively. The small number trapped of birds over 10 years old is interpreted as indicating mortality rather than sterility. Three groups are known to have originated when an older, very large colony was broken up by continued mammal predation.—D. S. Lehrman.

5414. BEADEL, H. L. Hawks vs. quail on quail preserves. *Jour. Wildlife Management* 3(1): 42-45. 1939.—Experience of a lifelong hunter and preserve owner for a score of years with hawks in relation to quail. Kills by hawks are by no means so common as ordinarily assumed and these birds often get crippled, birds that are best eliminated anyway. Moreover the hawks feed on rodent and serpent enemies of quail. Blue darters or accipitrine hawks are an exception but as the average man can not distinguish them, he had better leave all hawks alone. Plenty of escape coverts can easily be provided and they furnish practical protection against even blue darters. The author sums up: "My experience indicates that an above-average quail population can not only be maintained, but is more easily maintained by leaving hawks unmolested than by killing them."—W. L. McAtee.

5415. BECK, HERBERT H. Status of the Upland Plover. *Cardinal* 4(7): 163-166. 1938.—In Lancaster County, Pa., the numbers have increased from 1921 to 1937. The increase is apparently due to protection of the species in the U. S. since 1913.—D. S. Lehrman.

5416. BISSENETTE, THOMAS HUME, and ALBERT GEORGE CSECH. Pheasants activated by night-lighting return to normal nesting. *Jour. Wildlife Management* 3(1): 26-30. 1939.—Black-neck pheasants (*Phasianus c. colchicus*) (3 hens), ring-neck pheasants (*P. c. torquatus*) (2 hens), and Mongolian pheasants (*P. c. mongolicus*) (5 hens) with cocks, were night-lighted, Jan. 6-April 3, in small pens without cover, then released into large pens, abundant cover, and normal days like those of controls (4 hens and a cock) of each variety. Expts. began to lay Feb. 24, 21, 28, respectively, and averaged 0.377, 0.322, and 0.573 eggs per hen per day for first 15 days. Controls laid from April 7, 6, and 3, respectively, 0.483, 0.566, and 0.816 eggs per hen per day for their first 15 days. Hatchability of both controls and expts. was high as judged by samples set under hens. After release, ring-necks laid only 2 eggs loose in the pen and built no nests; black-necks laid some scattered eggs, built a nest, and set on 12 eggs laid therein; Mongolians did likewise, setting on clutches of 12 and 13 eggs. Reset under hens, these clutches yielded 91% fertility and 83% hatch for black-necks and 87% and 79%, respectively, for Mongolians. These last 2 vars. can be used to get numerous early fertile eggs and still be planted later in suitable regions with good prospects of producing broods in the immediately following normal breeding season. Ring-necks seem to be less adaptable for such double use.—T. H. Bissonette.

5417. BURROUGHS, R. D. An analysis of hunting records for the Prairie Farm, Saginaw County, Michigan, 1937. *Jour. Wildlife Management* 3(1): 19-25. Map, 2 pl. 1939.—The Prairie Farm (8,401 acres) is so isolated by rivers and canals that it is possible to register all hunters, and to determine their success. The survey involved 2,181 man-days of hunting. The average number of hunters per day was 128, which is equivalent to 9 hunters per sq. mile of range. The total kill of ♂ pheasants was 616, which is equivalent to 47 per sq. mile, or 1 for each 13.6 acres. Sight records indicated a sex ratio of 1 ♂ to 2 ♀ pheasants. Comparison of the kill per gun-hour on the first 3 and the last 3 days of the hunting season indicated that less than half of the cocks inhabiting the area were killed. These data were used for estimating the total pheasant population on the Prairie Farm at the opening of the hunting season, which was calculated to have been 3,696 birds; or 1

pheasant for each 2.2 acres. Subsequent observations did not disclose any evidence of over-shooting.—R. D. Burroughs.

5418. HAMERSTROM, F. N. Jr., and JAMES BLAKE. A fur study technique. *Jour. Wildlife Management* 3(1): 54-59. 2 fig. 1939.—The method, designed for ditch- and stream-dwelling furbearers on a 100,000 acre area in central Wisconsin, consisted of repeated surveys. Fur sign was mapped, by species, by the use of symbols (reproduced in the paper). Notes on animals seen, mortality, foods, water levels, etc., were taken. Field maps were transferred to large-scale base maps for permanent record. The 200 miles of ditches and streams were covered by 2 crews of 2 men each in 17 days. 5 surveys were made between May 1936 and Aug. 1937. The survey data, summarized in the paper, showed where the animals were at different seasons, exactly where range improvement was necessary, where not needed, where impracticable, and what factors needed to be manipulated; where refuges should be placed. On an area too large to census and lacking kill records, abundance and distribution of sign can be used in empirical regulation of trapping. Suggestion: censuses of sample areas of heavy, medium, and light sign could be applied to the mileage of inhabited shore shown on maps to give a more accurate population figure than the general estimates so often used.—F. N. Hamerstrom, Jr.

5419. KLEMOLA, V. M. Finnish game and hunting. *Silva Fennica* 40: 1-27. 5 maps. 1937.—Account of game spp., their distribution, and prevalence. The mallard forms half of the waterfowl population and the black grouse predominates among upland game birds. Spp. are grouped as they are attracted or repelled by cultivation and other human activities. The brown hare and partridge, both newcomers, are most important among game spp. favored by cultivation, and the ptarmigan, capercaillie, and hazel grouse among those driven away. Rational hunting is not destructive to the fauna but most of the hunting, both past and present, is irrational and constitutes plundering of the fauna. The record in extermination and near extirpation reads something like that of the U. S.—the beaver extinct, and the marten, lynx, otter, bear, wolf, and wolverine seriously threatened. The introduced muskrat is spreading despite intensive trapping. Game zones, correlated with vegetation and climate, and their inhabitants are discussed in some detail. Methods of hunting, both primitive and modern, are described. The harvesting of game and fur as an economic factor was of decisive importance in earlier times and is still depended upon to some extent, although game on the whole has greatly decreased. Statistics are given on the take of fur animals including in a Table the number of individuals of 6 spp. reported in representative years since 1880. [When the take can be so stated in numbers of 55 or under as for 4 spp. (bear, wolf, lynx, and wolverine) in all years since 1920, it would seem that the animals concerned are near extinction.] The bag of game birds, itemized for 1933-34, seems very large. The monetary value of game is estimated at from 30 to 40 million Finnish marks (\$756,000-\$1,008,000) annually. The State compensates for damage by bear and elk and pays bounties on several fur animals, the bulk of the total amount for seals. Private organizations for game protection are increasing in importance. Under a law of 1934, fees paid by members to the State are expended for game preservation. Members are entitled to hunt only in areas for which they have permits. The work of the associations (about 200 in number) is conducted by local boards, which have the cooperation of advisors associated with an inspector of hunting in the Ministry of Agriculture. The present game laws are described and their prohibitions and closed seasons tabulated. 6 mammals and 7 birds are given total protection. The general text of the article abstracted is in English and a summary is in Finnish.—*Courtesy Wildlife Review*.

5420. LEOPOLD, ALDO, ELLWOOD B. MOORE, and LYLE K. SOWLS. Wildlife food patches in southern Wisconsin. *Jour. Wildlife Management* 3(1): 60-69. 1939.—90 food patches of 30 grains were offered during 4 years, and their consumption by wildlife deduced from tracks, flushing, observation from blinds, and stomach analyses. The authors conclude that desirable summer and fall foods must be palatable and easily lodged; winter foods must be stiff-stemmed and unpalatable enough to escape earlier ex-

haustion; spring foods must be unpalatable and easily lodged so as to remain protected by winter snow. The 30 grains are classified according to these criteria, and according to their value to quail, pheasants, and winter songbirds. Their phenology is recorded in tabular form. A key is given for the design of composite patches which combine the properties needed at various seasons. Some grains show a different palatability when offered on the stalk than when exposed as shelled grain in hoppers. Consistency or inconsistency with hopper tests is pointed out.—*A. Leopold.*

5421. LEWIS, HARRISON F. Size of sets of eggs of the American eider. *Jour. Wildlife Management* 3(1): 70-73. 1939.—Record of 1,131 sets of *Somateria mollissima dresseri* observed on north shore of Gulf of St. Lawrence in 1934-1938. One to ten eggs each, average 4.04. Annual averages range from 3.89 (1936) to 4.25 (1938). Sizes of sets in descending order of frequency are 4, 5, 3, 2, 6, 1, 7 and 8, 10. Average number of eggs before mid-June, 3.97; after mid-June, 4.08.—*H. F. Lewis.*

5422. McATEE, W. L. The electric fence in wildlife management. *Jour. Wildlife Management* 3(1): 1-13. 2 pl. 1939.—Electric fencing promises to solve outstanding difficulties of the wildlife manager, but the device needs perfecting and constantly cautious and intelligent use. Types of fences, means of electrifying them, and methods and difficulties of installation are described. Experiences reported to date in controlling animals are quoted with reference to antelope, bear, buffalo, cat, coyote, deer, elk, fishes, livestock, rabbits, and raccoon. The article contains suggestions, objections, and cautions relative to the use of electric fences, and concise directions as to what to do in case of severe electrical shock.—*W. L. McAtee.*

5423. McCANN, LESTER J. Studies of the grit require-

ments of certain upland game birds. *Jour. Wildlife Management* 3(1): 31-41. 1939.—Experiments with bobwhite quail, *Colinus v. virginianus*, and ring-necked pheasants, *Phasianus colchicus torquatus*, on floored pens showed that a continued gritless ration resulted in loss of weight and death, probably due to mineral deficiency associated with lack of fresh grit. When feeding insoluble grit (quartz) it was found that grit consumption increased markedly, but would decrease almost immediately if Ca were added. Glacial gravel fed as grit did not undergo such increased consumption, and if substituted for quartz after an increase had occurred, would give the same effect as Ca. Thus, since grains are known to be Ca-deficient, it appears that granivorous birds depend upon grit for some of this necessary element. Glacial gravel, in some areas at least, is capable of supplying it. These facts gain ecological significance when correlated with the known success of certain exotic, granivorous birds in some glaciated areas or areas having limestone outcroppings, and their known failure in certain unglaciated areas.—*L. J. McCann.*

5424. MUNRO, J. A., and W. A. CLEMENS. The food and feeding habits of the red-breasted merganser in British Columbia. *Jour. Wildlife Management* 3(1): 46-53. Map. 1939.—The red-breasted merganser (*Mergus serrator*) is an abundant visitant to the coast regions of British Columbia from Sept. to Apr. inclusive. Thus the relation of the species to the fisheries is seasonal and centers chiefly about its feeding habits on the coast waters. The food of 96 specimens taken on the lower stretches of coastal streams consisted largely of salmon eggs and sculpins; that of 15 specimens taken on the sea comprised chiefly herring with a smaller percentage of salmonoids, eulachons, sticklebacks, sculpins, blennies, rockfishes, and crustaceans.—*J. A. Munro.*

BIOLOGICAL ABSTRACTS

Editor-in-Chief, JOHN E. FLYNN; Assistant Editor, JEAN MACCREIGHT

VOLUME 13

MAY, 1939

Entries 7060-8867

NUMBER 5

GENERAL BIOLOGY

Editors: A. H. GRAVES, *Plant*; C. A. KOFOID, *Animal*

(See also in this issue Entries 7090, 7091, 7989, 7990, 7991, 7993, 7994, 7995, 7997, 8000, 8001, 8034, 8069, 8166, 8475)

MICROSCOPY, INSTRUMENTS, TECHNIQUE

7060. **BENEDEK, TIBOR.** Use and application of photography in mycology. *Jour. Biol. Photogr. Assoc.* 7(3): 116-120. 2 pl. 1939.—Mass cultures are grown in special flasks and backed up with a plaster of paris mount for photographing. Notes are given for handling cultures in tubes. The tube holder includes a spirit level and a nut for attachment to a tripod. Cultures grown in Erlenmeyer flasks are photographed by cutting off the top of the flask after the culture has reached full growth.—O. W. Richards.

7061. **BUSANOVICH, G. M.** Notes on the control of photographic detail. *Jour. Biol. Photogr. Assoc.* 7(3): 105-112. 2 pl. 1939.—To assist the control of detail for scientific photographs the following causes of lack of detail are discussed: partial spectral-insensitivity of the emulsion, incorrect exposure, incorrect contrast, fog, grain of the negative, halation, marks, spots (local loss of detail) and poor definition or unsharpness.—O. W. Richards.

7062. **HENBEST, LLOYD G.** Target for testing photographic lenses and the focus of projection printers. *Jour. Biol. Photogr. Assoc.* 7(3): 120-126. 1939.—A piece of mirror has the silver removed in lines in a similar form to the Abbe test plate. The image formed by the photographic lens is examined in air with magnifications of 10 to 60X. The same screen permits accurate focusing of the enlarger. With such a test plate the aberrations of the lens may be evaluated.—O. W. Richards.

7063. **HOFMANN, RUDOLF.** Unterwasser-Aufnahmen mit einer Tiefsee-Kamera in der Kieler Bucht. *Kieler Meeresforsch.* 2(2): 352-354. 2 pl. 1938.—A description with illustrations of a deep-sea camera built on the same principle as Beebe's bathysphere. Photos shown were made with ordinary daylight up to 10 m. depths, and with artificial lighting down to 250 m. depths. The prints show up sharply for a short range, and fairly well at long range. Work has since been done with color film, and at depths down to 3000 meters.—W. M. Morton.

7064. **HORTON, NATHAN S.** An introduction to ornithological photography. *Jour. Biol. Photogr. Assoc.* 7(3): 97-101. 2 pl. 1939.

7065. **LEVIN, ALBERT.** Photographing gross specimens on Kodachrome film. *Jour. Biol. Photogr. Assoc.* 7(3): 113-115. 1 pl. 1939.—The washed specimen is placed on the floor, lighted by two no. 2 photofloods and photographed with a telephoto lens on the Leica copying stand with a Pola-screen.—O. W. Richards.

7066. **MAIER, EUGENE.** Photographic records of petri dishes. *Jour. Biol. Photogr. Assoc.* 7(3): 129-130. 1 pl. 1939.—The cultures are placed in, or grown in Petri dishes with plane-parallel, cemented bottoms and permanent records are obtained by placing the culture on chloride paper in the dark room and exposing it to a 75 or 100 wt. bulb 1.5 to 2 m. distant for 10-25 secs. Counts of the colonies may be made from the pictures.—O. W. Richards.

7067. **ROBINSON, A. I., and T. F. WEST.** The acidity of Canada balsam. *Quart. Jour. Pharm. and Pharmacol.* 11(4): 709-713. 1938.—In a previous paper (*Quart. Jour. Pharm. and Pharmacol.* 11: 92, 1938) the variation in acidity of dried Canada balsam was discussed. The present paper shows that the figure found depends on the solvent and

the nature of the volumetric soln. used. The B.P. 1932 method is satisfactory only when the amt. of resin is of the order of 1 gram. With larger amounts a true acid value is obtained either by using an alcoholic alkali solution for titration, or by increasing the volume of alcohol used as solvent for the balsam to about 40 times the weight of the balsam taken.—H. A. McGugan.

7068. **WELCH, ALBERT S.** Motion pictures with a binocular microscope. *Jour. Biol. Photogr. Assoc.* 7(3): 127-129. 1939.—One tube of the binocular body is used for the camera and the other for observation with the eye, making it serve as an equal intensity beam splitter.—O. W. Richards.

TEXTS AND EDUCATION

7069. **BAITSELL, GEORGE A.** (edited by). *Science in progress.* With foreword by HARLOW SHAPLEY. xiv+322p. 90 fig. Yale University Press: New Haven, 1939. Pr. \$4.—An excellent panoramic view of current development in science is furnished by this collection of 10 lectures, presented to chapters of the fraternity of the Sigma Xi during the year 1937-1938. Individually the lectures represent condensed, thought-provoking, highly informative reviews written by men of eminence in their respective subjects. Each of the authors is singularly well fitted to review the history of the development of his own research subject, evaluating earlier contributions in the light of their fruitfulness in forming modern views. Each review begins with a brief consideration of the classical observations which opened the problem to scientific study; e.g., Stanley's paper "Recent advances in the study of viruses" begins with the work of Iwanowski and Beijerinck, and Williams' paper "The general rôle of thiamin in living things" goes back to the discovery of vitamin B₁ and the experiments of Eijkman. The bibliographies are brief, and the emphasis is upon the current developments; i.e., those within the past 3 or 4 years. The subjects so treated are the following: Atoms, new and old, by E. O. LAWRENCE; The separation of isotopes and their use in chemistry and biology, by HAROLD C. UREY; Recent advances in the study of viruses, by W. M. STANLEY; New views in virus disease research, by L. O. KUNKEL; Vitamins and hormones, by KARL E. MASON; The general rôle of thiamin in living things, by R. R. WILLIAMS; Internal secretions in reproduction, by EDGAR ALLEN; Recent developments in our knowledge of chromosome structure and their application to genetics, by T. S. PAINTER; Electrical potentials of the human brain, by E. NEWTON HARVEY; Animal metabolism: from mouse to elephant, by FRANCIS G. BENEDICT.—Taken together these chapters do not, in any sense, provide a unified science but they do reveal an underlying unity in the application of a common technic in widely separated fields.—J. E. F.

7070. **LAMEERE, AUG.** Précis de zoologie, Tome 5, fasc. 4. Les Hyménoptères. pp.393-536. 113 fig. H. Cauwenberg: Bruxelles, 1938.—A systematic review with extensive bibliography.—C. A. Kofoid.

7071. **MEDSGER, OLIVER PERRY.** Edible wild plants. xv+323p. With an introduction by ERNEST THOMPSON SETON. Frontispiece, illus. Macmillan Co.: New York,

1939. Pr. \$3.50.—In this comprehensive handbook, based on data assembled over a period of 30 yrs. and embodying the author's personal observations and expts., about 175 spp. of America's edible wild plants are descr. in detail, and, in addition, many others are listed with descriptive notes. These are exclusive of the mushrooms which are only briefly mentioned. The plants are grouped and descr. under the following headings: Edible wild fruits; edible nuts; edible seeds and seed pods; salad plants and potherbs; edible roots and tubers; beverage and flavoring plants; sugars and gums. The edibility of many of these plants, the uses of which have been forgotten subsequently, was known to the Indians and to the early settlers and explorers, whose lives not infrequently depended upon a knowledge of food-sustaining wild plants. The author states, "Many human beings have starved on the plains and deserts, amid plenty, not knowing what to eat or how to prepare it." Embodied within the descriptions are also given the origins of many of the plants, bits of plant lore, an occasional verse, and, where necessary, directions as to preparation and cooking of the plant.—In place of a key the author substitutes a "finding index" (pp.235-304) which gives the names of the plants, both common and scientific, with range, season, and outstanding characteristics. As a rule the International System of Nomenclature has been followed. A general index (pp.305-323) concludes the book.—*M. J. Fisher.*

7072. RICKETS, EDWARD F., and JACK CALVIN.

Between Pacific tides. An account of the habits and habitats of some five hundred of the common, conspicuous seashore invertebrates of the Pacific coast between Sitka, Alaska, and northern Mexico. xxii+320p. 46 pl., 112 fig. Stanford University Press: California, 1939. Pr. \$6.—This is a seaside book for students and investigators in zoology dealing with the invertebrates of the littoral regions of the Pacific Ocean from Alaska to Mexico. It is organized on an ecological basis by habitat, tidal zone, and station and records about 500 of the more evident invertebrates known from these regions. The text does not give morph. details or taxonomic keys but has considerable natural history and ecology concerning the animal associations characteristic of the ecologic niches of the littoral area. Discussion and diagrams are utilized to define the various types of habitat whose animal associations are described. Full-leaf plates of photographs of the species and drawings to scale are reproduced to assist in identification of the species. A systematic index, with references to pertinent literature, of the animals noted in the text is given. There is also a bibliography of works of reference.—*C. A. Kofoid.*

MISCELLANEOUS

7073. BURK, D. A scientist in Moscow. *Sci. Mon.* 47: 227-241. 1938.—Soviet science and scientific life are descr. on the basis of recent visits to the U. S. S. R. and experience as a worker in a Moscow laboratory.—*O. P. Lester (courtesy of Psych. Abst.).*

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 7920, 8289, 8443, 8475, 8673)

HISTORY

7074. COLE, F. J. Microscopic science in Holland in the seventeenth century. *Jour. Quekett Microsc. Club Ser.* 4 1(2): 59-77. 5 pl. 1938.—Describes the work of Leeuwenhoek, and more briefly that of Swammerdam and Frederik Ruysch.—*W. C. Tobie.*

BIOGRAPHY

7075. BRIERLEY, WILLIAM B. The Association of Applied Biologists and the Annals of Applied Biology—a retrospect (1904-38). *Ann. Appl. Biol.* 26(1): 178-195. 4 pl. 1939.—A history of the Association, with portraits of its Presidents, F. V. THEOBALD, 1904-1906; ARTHUR E. SHIPLEY, 1907-1909; G. H. CARPENTER, 1910-1913; ROBERT NEWSTEAD, 1914-1917; JOHN B. FARMER, 1918; DAVID PRAIN, 1919-1921; EDWARD B. POULTON, 1922-1923; V. H. BLACKMAN, 1924-1925; J. C. F. FRYER, 1926-1927; E. J. BUTLER, 1928-1929; A. D. IMMS, 1930-1931; W. B. BRIERLEY, 1932-1933; T. GOODEY, 1934-1935; J. HENDERSON SMITH, 1936-1937; C. T. GIMMINGHAM, 1938.—

7076. FRANKEN, J. L. M. A note on a visit to Christian Hendrik Persoon's grave. *Jour. S. African Bot.* 4(4): 127-128. 1 pl. 1938.—This note contains particulars as to Persoon's testament and the locality of his grave. It is situated in the "32e Division 2 Sect. le Ligne, face 75, No. 35 du Chemin Gay" at the cemetery of Le Père Lachaise in Paris.—*J. L. M. Franken.*

7077. GULLICKSON, T. W. Theophilus Levi Haecker, 1846-1938. *Jour. Dairy Sci.* 22(3): 203-206. 1 fig. 1939.—Theophilus Levi Haecker, known as "Father of dairying in Minnesota."—*T. W. Gullickson.*

7078. HANDLEY, W. SAMPSON. Makers of John Hunter. *Lancet* 236(6025): 369-375. 1939.—The Hunterian oration of 1939, Feb. 14, 1939; the intellectual descent of Hunter from William Harvey; the influence of his older brother, William Hunter, James and John Douglas, William Cheselden and Mrs. John Hunter; the Great Windmill Street School of Anatomy;—these are some of the topics

which the author has packed full of historic and anatomical interest. The article is illustrated, including a full page reproduction of "The Life School at the Royal Academy" (painting, Windsor Castle) which portrays Hunter next to Sir Joshua Reynolds. A stimulating contribution to the history of biology and one likely to make the reader wish to follow up some of the lines of thought suggested.—*J. B. Paton.*

7079. OLMSTED, J. M. D. Claude Bernard, physiologist. With foreword by Alexis Carrel. xvi+272p. Frontispiece, illus. Harper and Brothers: New York, 1938. Pr. \$4.—This biography is based on investigations in France of the birthplace, family, private correspondence, and contemporaries of Claude Bernard (1813-1878). It deals with his ancestry, growth, medical education, and early and later scientific career as an experimental physiologist. His great contributions were his discoveries of pancreatic digestion, the glycogenic function of the liver, the action of vasomotor nerves, and the toxic effects of poisons, especially of curare and carbon monoxide. In general physiology his work on *Phenomena of Life Common to Animals and Plants* was planned as a beginning of a work never finished. A bibliography of contributions is included.—*C. A. Kofoid.*

7080. PALHINHA, RUY TELLES. Luis Wittnich Carrisso (1886-1937). *Bull. Soc. Bot. France* 85(1/2): 31-34. 1 fig. 1938.—Biographical sketch and appreciation of this brilliant Portuguese botanist.—*P. D. Strausbaugh.*

7081. SOULE, MALCOLM H. Earl Baldwin McKinley [1894-1938]. *Amer. Jour. Trop. Med.* 19(2): 97-101. Portrait. 1939.—Biography and appreciation of this distinguished student of tropical medicine and geography of disease.

7082. [STEERE], W. C. Raymond H. Torrey (1880-1938). *Bryologist* 42(2): 36. Portrait. 1939.

7083. ZIMMERLE, H. Frein Elisabeth Dr. v. Gaisberg. *Allg. Forst- u. Jagdztg.* 115(2): 37-39. 1939.—Dr. von Gaisberg (1895-1938), assistant in botany at the Forest Research Institute of Württemberg, was author of publications on larch canker, Douglas fir blights, forest mosses and grasses, and various ecological studies.—*W. N. Sparhawk.*

BIBLIOGRAPHY

MRS. EILEEN R. CUNNINGHAM, *Editor*

(See also in this issue Entries 7243A, 7713, 8443)

7084. GAINES, STANLEY H. (compiled by). With abstracts by FRANCESCA VINCENT, MARION BLOOM, and JAMES F. CARTER. Bibliography on soil erosion and soil and water conservation. *U. S. Dept. Agric. Misc. Publ.* 312. v+651. 1938.

7085. GONZALEZ, B. M. Published contributions of the College of Agriculture. XVI. *Philippine Agric.* 27(10): 855-865. 1939.

7086. JOURNAL OF THE ENTOMOLOGICAL SOCIETY OF SOUTHERN AFRICA. Vol. 1, March, 1939. Hon. Editor, T. J. NAUDE. 160 pages, 7 articles. Price of Vol. 1, 1£ 2s 6d. Published by the Entomological Society of Southern Africa: P. O. Box 103, Pretoria, Union of South Africa.—The following papers comprise the first volume: ALEXANDER CUTHBERTSON, On the biology of *Cratichneumon tabaniformis* F. (Diptera; Sarcophagidae), which breeds in the nests of sand wasps *Bembex* F. (Sphegidae); B. DE MEILLON, Notes on Ceratopogonidae (Dipt.; Nematocera) from southern Africa; H. K. MUNRO, Studies in African Trypetidae, with descriptions of new species; C. JACOT-GUILLARMOD, New species of Phlaeothripidae (Thysanoptera) from South Africa; A. J. T. JANSE, On the South African Cuellidae (Noctuidae); M. N. S. IMMELMAN, On the control of temperature and humidity of air in small cabinets; and JOSEPH OMER-COOPER, The classification of the recent hexapod insects.

7087. MANOIL, A. Bibliografia riguardante la "Scuola di Psicologia" della Università Cattolica di Milano. (Con un supplemento bibliografico delle pubblicazioni di Fr. Agostino Gemelli, O. F. M., nel campo della biologia, fisiologia, istologia, medicina, filosofia, religione, ecc.) [Bibliography on the "School of Psychology" at the Catholic University at Milan, with a supplement by Fr. Agostino Gemelli, in the fields of biology, histology, medicine, philosophy, religion, etc.] 45p. Unione Tipografica: Milan, 1938.—(Courtesy of *Psych. Abstr.*)

7088. PSYCHOSOMATIC MEDICINE. Experimental and Clinical Studies. Vol. 1, no. 1, January, 1939. Editors, FRANZ ALEXANDER, DANA W. ATCHLEY, STANLEY COBB, HALLOWELL DAVIS, CLARK L. HULL, HOWARD S. LIDDELL, and GROVER F. POWERS. Managing Editor, FLANDERS DUNBAR; Review Editor, THEODORE P. WOLFE. 200p. Publ. by quarterly with the sponsorship of the Committee on Problems of Neurotic Behavior, Division of Anthropology and Psychology, National Research Council. \$5 per year, in U. S. A. and Canada, elsewhere \$5.50 per yr.—"This journal is devoted not to the isolated problems of the diseased mind or the diseased body, but to the interrelationships between emotional life and bodily processes both normal and pathological.—It is not concerned with the metaphysics of the body-mind problem. Emphasis is put on the thesis that there is no logical distinction between 'mind and body,' mental and physical. It is assumed that the complex neurophysiology of mood, instinct and intellect differs from other physiology

in degree of complexity, but not in quality. Hence again divisions of medical disciplines into physiology, neurology, internal medicine, psychiatry and psychology may be convenient for academic administration, but biologically and philosophically these divisions have no validity. It takes for granted that psychic and somatic phenomena take place in the same biological system and are probably 2 aspects of the same process, that psychological phenomena should be studied in their psychological causality with intrinsically psychological methods and physiological phenomena in their physical causality with the methods of physics and chemistry."—*Psychosomatic Medicine* has been established (1) to integrate and correlate studies up to now scattered in the journals devoted to specialties or separate disciplines and (2) mainly to furnish a medium for longer papers, the acceptance of which, by the established journals, is difficult. Reviews will be accepted; papers expressing mere opinion will not, as a rule. The editors advise that short papers be offered to other journals.—The first issue contains:—Psychological aspects of medicine, by FRANZ ALEXANDER; (A review of some recent contributions on the hypothalamus)—Hypothalamic functions in psychosomatic interrelations, by ROY R. GRINKER; The hypothalamus: A review of the experimental data, by W. R. INGRAM; and Note with regard to temperature regulation, by S. W. RANSON; (A symposium on hypertension, consisting of 7 papers)—Some cardiovascular manifestations of the experimental neurosis in sheep, by O. D. ANDERSON, RICHARD PARMENTER, and HOWARD S. LIDDELL; Present conception of "essential" hypertension, by L. N. KATZ, and LOUIS LEITER; Blood pressure and palmar sweat (galvanic) responses of psychotic patients before and after insulin and metrazol therapy, by ALFRED P. SOLOMON, CHESTER W. DARROW, and MELVIN BLAUROCK; Psychoanalytic study of a case of essential hypertension, by FRANZ ALEXANDER; Hostility in cases of essential hypertension, by LEON F. SAUL; Blood pressure findings in relation to inhibited aggressions in psychotics, by MILTON L. MILLER; and Emotional factors in essential hypertension, presentation of a tentative hypothesis, by FRANZ ALEXANDER; a review—Recent advances in the pathogenesis and treatment of hypertension—by EDWARD WEISS; and a brief communication on Frustration as an experimental problem, by SAUL ROSENZWEIG.

7089. SPRAGUE, T. A., and M. S. SPRAGUE. The herbal of Valerius Cordus. *Jour. Linn. Soc. [London] Bot.* 52(341): 1-113. 1939.—A monographic study of this 16th-century herbal, supplying botanical identifications and synonymy of all the plants described or figured in it, about 66 of which were new. The Introduction includes accounts of the scope, characteristics and publication of the herbal, the life of Valerius Cordus (1515-1544), previous attempts to identify the plants, and a systematic conspectus of these, arranged under families, genera and spp., with indication of previous records.—T. A. Sprague.

EVOLUTION

(See also in this issue Entries 8742, 8860)

7090. LICHTIG, IGNATZ. Die Entstehung des Lebens durch stetige Schöpfung. xx+371p. N. V. Noord, Hollandse Uitgevers Maatschappij: Amsterdam, 1938.—The author reviews critically the branches of science: botany, zoology, general biology, the theory of evolution and heredity, paleo-botany, -zoology, -biology, plant and animal phylogeny, stratigraphy, phytogeography and zoogeography, paleogeography, paleoclimatology, and some geophysics, geochemistry, and astrophysics, in an inquiry as to the origin of life and as to how multifarious living beings developed on our planet. Did the living matter originate from the lifeless matter? How often did this creation take place? Did it occur at only one, or at numerous spots on

earth? In how many forms did this creation take expression? A combined review of the concepts of the Greek philosophers, of the men of the middle ages, and the scientists of our era, reveals the universal belief that life developed out of non-living matter and has a physico-chemical basis. Contrary to the Darwinian theory of the origin of species (monophylogenesis), the author mobilizes "fact" after "fact" to show that the miracle of the creation of life took place once, but the natural forces which gave birth to life in the dim geological past have been at work uninterruptedly, and, therefore, have never ceased to recast new models of life (polyphylogenesis). The life is defined as a transition of the non-living matter of simpler into a

living form of higher complexity capable of maintaining itself at the latter. The transformation of the simpler systems into higher complex systems is a continuous process under the influence of natural forces. Light waves take on the form of electrons; electrons are transformed into atomic units; atoms into molecules. From simpler molecules rise molecules of higher complexity, such as viruses, and uni- and multicellular living forms, culminating in the

development of giant vertebrates and the creative man. The author believes there is not a trace of evidence to show that the forces which created life ever came to an end. Although every beginning has an end, there is no proof at present regarding the arrival of that fatal end. Hence, life is being created step by step from non-living matter all the time in all possible forms at all possible places on our planet.—*M. G. Sevag.*

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. McCLUNG, *Animal*

(See also in this issue Entries 7069, 7134, 7138, 7148, 7150, 7151, 7154, 8375, 8447, 8451, 8715)

GENERAL

7091. JUST, ERNEST EVERETT. The biology of the cell surface. xi+392p. 42 illus. (some col.) P. Blakiston's Son and Co., Inc.: Philadelphia, 1939. Pr. \$5.50.—This book presents a complete exposition of the work of a well known authority. The author's own expts. are reviewed and their relation to various aspects of biology is considered. Among the topics included are fertilization, cell division, cleavage and differentiation, and chromosomes. Throughout, emphasis is placed on biological rather than physico-chemical observation and interpretation. An effort is made to interest the lay reader. This is done by explanation of various biological phenomena in terms understandable by those who have never studied biology.—*L. V. Heilbrunn.*

7092. PFEIFFER, H. Experimental researches on the non-Newtonian nature of protoplasm. *Cytologia, Fujii Jub. Vol. 701-710*. 2 fig. 1937.—Protoplasm is not a pure liquid or true solution; it exhibits anomalous flow, and behaves as if it contained aggregates of particles. The double refraction of protoplasm when flowing through a capillary indicates optical and geometrical asymmetry of the particles. The structure breaks down under pressure with resulting decrease in viscosity.—*H. Hibbard.*

PLANT

7093. CHANDLER, CLYDE, W. M. PORTERFIELD, and A. B. STOUT. Microsporogenesis in diploid and triploid types of *Lilium tigrinum* with special references to abortions. *Cytologia, Fujii Jub. Vol. 756-784*. 3 pl., 11 fig. 1937.—Abortions in microspores in triploid clones arise in connection with the extra set of chromosomes, which, however, function normally in the somatic tissues. The abnormalities in the microsporogenesis of triploids are classified as those appearing (1) in the conjugation of homologous chromosomes, (2) in premature separation of sister chromatids in unpaired chromosomes, (3) in distribution resulting in daughter cells with more or less than the normal haploid chromosome number of 12. Abnormalities are also described in connection with the mitosis which produces the generative cell.—*H. Hibbard.*

7094. GUILLIERMOND, A. Sur la coloration vitale des vacuoles par le rouge neutre dans les cellules du protonéma de "Polytrichum commune." *Cytologia, Fujii Jub. Vol. 809-813*. 4 fig. 1937.—This paper controverts previously published observations on this species by Elliot Weier, and shows how the vital staining is accomplished by the appearance in the vacuoles of small red particles showing Brownian movement, which fuse forming larger masses at the sides of the vacuoles, followed by gradual diffuse staining of the vacuole contents, and a tendency of precipitates to emigrate into the perivacuolar cytoplasm. This description fits this species and also many fungi. No vacuoles are artificially produced by the dye.—*H. Hibbard.*

7095. HAGA, TUTOMU. Karyotypic polymorphism in *Paris hexaphylla* Cham., with special reference to its origin and to the meiotic behavior. *Cytologia, Fujii Jub. Vol. 681-700*. 24 fig. 1937.—Root tip cells treated with chloral hydrate show chromosomes shorter and less twisted than normal, but relative dimensions are still exact. The basic chromosome number is 5, each chromosome of the set being morphologically distinguishable. 6 karyotypes were found in nature, 4 of which were diploid and 2 triploid. No differences in distribution or in ecology were noted among the strains showing these differences. Only 2 of the

5 chromosomes (C and D) showed morphological differences in the various karyotypes, chromosomes A, B and E being alike in all. The different conditions with respect to C and D are explained as being due in some cases to simple translocation of part of the short arm of C to the satellite of D (resulting in C' and D'), and in other cases to the loss of the satellite of D (resulting in D-). All but 2 karyotypes were heterozygous with respect to either the C or D conditions or to both.—*R. E. Cleland.*

7096. JEFFREY, EDWARD C. The somatic chromosomes of *Trillium*. *Cytologia, Fujii Jub. Vol. 857-866*. 4 fig. 1937.—By fixing thin slices of tissue good fixation of somatic mitoses is possible. The chromosomes are smaller than those of the germ cells. Details of mitosis are described in which the chromatid or chromosomal organization of the chromosomes is established.—*H. Hibbard.*

7097. KAGAWA, FUYUO. Chromosomal chimeras and polyploidy in *Solanum gracile* Link. *Cytologia, Fujii Jub. Vol. 733-744*. 23 fig. 1937.—Decapitation of young plants resulted in shoots from the callus, among which some shoots showed mixtures of diploid and triploid characters (chimeras). Triploid plants were obtained by crossing an individual which was probably a true tetraploid with diploid plants. In these only 13% of the pollen grains matured.—*H. Hibbard.*

7098. KIHARA, H., and I. NISHIYAMA. Possibility of crossing-over between semihomologous chromosomes from two different genoms. *Cytologia, Fujii Jub. Vol. 654-666*. 1 fig. 1937.—Studies of crosses between *Haynaldia villosa* ($n=7$) and *Triticum polonicum* ($n=7$) and backcrosses of this F_1 to *T. polonicum* shed light on the occurrence of irregularities in maturation divisions in allopolyploids. These are explained as due to exchange of segments between partially homologous chromosomes derived from the 2 parents, such exchange being the result of crossing-over in the homologous regions.—*R. E. Cleland.*

7099. KOSTOFF, DONTCHO. A contribution to the chromosome structure and behavior. *Cellule 47*(2): 217-226. 1 pl., 4 fig. 1938.—Hematoxylin-stained chromosomes of root tips of *Crepis* and *Triticum*, which have been differentiated more than usual, show heterochromatic regions which may correspond to the heterochromatic regions in *Drosophila*, where genetically inert material lies. This suggests that genes are not located in chromomeres, since these are also in the heterochromatic regions.—*H. Hibbard.*

7100. MARTENS, P. Nouvelles recherches de physiologie cellulaire sur les poils staminaux de *Tradescantia liberis* de leur cuticule. *Cellule 47*(2): 245-284. 55 fig. 1938.—After slightly plasmolysing the cells with weak sugar solution, the external pellicle was detached. Partial removal at various points, followed by endosmosis or exosmosis, showed remarkable plasticity of the cellulose wall. It may stretch as much as 100% of its length, or be folded into various forms. Under certain conditions of osmotic pressure the normal cell boundary can be made to split into pellicle and wall. The nature of the external pellicle, or cuticle, was studied by staining, by the use of HCl and alkalis, and by sectioning. It was found to be a single, simple layer.—*H. Hibbard.*

7101. MURDIA, M. S. Cytological studies of certain members of the family Saprolegniaceae. I. *Jour. Indian Bot. Soc.* 17(5/6): 301-310. 1938.—The following types were studied: *Achlya dubia*, *Thraustotheca clavata*, *Aphanomyces camptostylus*, *A. cladogamus* and *Pythiopsis intermedia*.

Observations on the living material were made both with and without vital staining. Mitochondria were stained supravivally with Janus green, Höchst B and dahlia violet but these stains were toxic and stained the mitochondria in phases preceding the death of the hyphae. Mitochondria were filamentous in *A. dubia* and *T. clavata* and both filamentous and granular in others. A number of vacuolar vital dyes were employed to color vacuolar system both supravivally and intravivally. Neutral red proved the least toxic and most satisfactory. No metachromatic corpuscles have been found in these fungi. Helly's liquid was found the most satisfactory of several mitochondrial fixatives employed. Iron alum hematoxylin was employed to stain the mitochondria. With Lenhossek's liquid, which contains acetic acid and alcohol, mitochondria were not destroyed in any of these fungi. Nuclei of veg. hyphae were fixed in a number of fixatives and their structure was found to correspond to that which is commonly accepted for aquatic fungi.—*M. S. Murdia*.

7102. O'MARA, J. G. Observations on the immediate effects of colchicine. *Jour. Heredity* 30(2): 35-37. 1939. Frontispiece.—The hypertrophy usually associated with treatment involves the region of elongation but not the meristem under the conditions of treatment used. The colchicine-affected chromosomes are more accurately measurable than ordinary somatic chromosomes. This may indicate that the drug can be used profitably in studies of chromosome morphology in somatic tissues.—*Auth. summ.*

7103. RENNER, O. Zur Kenntnis der Plastiden- und Plasmavererbung. *Cytologia, Fujii Jub. Vol.* 644-653. 1937.—Foliage variegation appears in hybrids of *Eu-Oenothera* and in *Onagra*. Differences in foliage color in reciprocal crosses are due, at least in part, to differences in the constitution of the plastids in the various spp. In later generations, pale hybrids sometimes recover their greenness in part. The reasons for this are still to be worked out.—*R. E. Cleland*.

7104. SANTOS, JOSÉ K. Macrosporangogenesis of *Lilium philippinense* Baker. *Cytologia, Fujii Jub. Vol.* 822-835. 1 pl., 27 fig. 1937.—The haploid chromosome number is 12, diploid 24. The megasporocyte, derived from a sub-epidermal nucellus cell, grows into the embryo sac. After 2 divisions, the 4 nuclei, 3 close together at the chalazal pole and 1 at the micropylar pole, again divide. The 3 spindles at the chalazal end move together and fuse to a multipolar and finally to a bipolar spindle. The 2 cells resulting from this single spindle each contain 36 chromosomes and are larger than the 2 at the micropylar pole with 12 chromosomes each. These 4 cells divide at once and form the 2 synergids, the egg, the polar nucleus (fusion of 2), and the 3 antipodal nuclei.—*H. Hibbard*.

7105. SUGIURA, T. Studies on the chromosome numbers in higher plants, with special reference to cytokinesis. II. *Cytologia, Fujii Jub. Vol.* 845-849. 27 fig. 1937.—This is a brief analysis of the chromosome numbers of pollen mother cells of 27 spp. in 18 genera of seed plants. In every case the cytoplasm divides by a furrowing process.—*H. Hibbard*.

7106. TANAKA, NOBUNORI. Chromosome studies in Cyperaceae. I. *Cytologia, Fujii Jub. Vol.* 814-821. 27 fig. 1937.—Meiotic chromosome numbers were detd. for 19 spp. and 2 vars. of 7 genera of the Cyperaceae. Numbers in 3 genera, *Bulbostylis* ($n=42$), *Fimbristylis* ($n=5$) and *Lepocarpha* ($n=23$), are newly determined. The haploid no. 54 (*C. neurocarpa*) is added to the *Carex* series. Minor differences from earlier determinations are reported. Aneuploidy is characteristic of the series studied.—*R. E. Cleland*.

7107. TARWIDOWA, HELENE. Über die Entstehung der Lipoidtröpfchen bei Basidiobolus ranarum Eidam. *Cellule* 47(2): 205-216. 1 pl. 1938.—Growing mycelia in drop cultures were observed while living, unstained and vitally stained by a large number of stains. These results were checked on fixed material. Lipoidal droplets originate from chondriosomes. At first, long chondriocentes fragment into tiny granules which stain with Janus green and give no fat reaction. Later these granules grow larger and give a positive stain with Sudan III, and finally merge into still larger fat drops.—*H. Hibbard*.

7108. WADA, BUNGO. Mikrurgische Untersuchungen lebender Zellen in der Teilung. V. Die Einwirkung des Ammonia-Dampfes auf die Mitose bei den Staubfaden-

haarzellen von *Tradescantia reflexa*. *Cytologia, Fujii Jub. Vol.* 785-795. 2 pl. 1937.—Small amts. of ammonia caused swelling, first of the chromosome ground substance and then of the cytoplasm; larger amts. caused swelling of the chromosome threads and the chromosomes, but the swollen prophase chromatin threads were not yet injured too much to develop into chromosomes and finally separate into daughter nuclei; still greater amts. caused swelling of chromosomes and of cytoplasm, and mixing of these, resulting in the death of the protoplasm.—*H. Hibbard*.

7109. YUASA, AKIRA. Notes on the effects of alcohol and acetic acid on spermatogenesis in *Isoetes japonica* Al. Br. *Jap. Jour. Bot.* 9(3): 297-301. 1938.—The course of spermatogenesis is unchanged, the rate of development is accelerated by alcohol of lower percentage and retarded by acetic acid.—*P. D. Strausbaugh*.

ANIMAL

7110. ANDREW, WARREN. The Golgi apparatus in the nerve cells of the mouse from youth to senility. *Amer. Jour. Anat.* 64(2): 351-370. 3 pl., 2 fig. 1939.—The Golgi apparatus in the nerve cells of the brain of the mouse was studied in animals at various ages, to add to the cytological picture obtained by the Nissl technique of changes in these cells during the life history of the animal. Only pedigreed black mice were used. The material was treated by the Da Fano silver technique. Differences in the architecture of the Golgi apparatus in the cells of young, middle-aged and senile animals were found; these differences were constant or nearly so for all of the cells of any one group. The large Purkinje cells, the cells of the cerebral cortex, and of other regions were studied. The types of changes found in cells in different parts of the brain were very similar. Nissl preparations made from the same brains from which the Da Fano preparations were made confirmed the earlier findings on the differences in the Nissl substance of mice at different ages. The changes in the Golgi apparatus, when young and old mice were compared, were more marked than those in the Nissl substance.—*Auth. (courtesy Wistar Bibl. Serv.)*.

7111. ARGESSEANU, SIMONE, et RAOUL M. MAY. Études différentielles sur la cellule embryonnaire et adultes. I. Évolution des constituants cytoplasmiques des cellules de l'épithélium intestinal du poulet (*Gallus domesticus*). *Arch. Anat. Microsc. [Paris]* 34(3): 441-448. 6 fig. 1938.—Vital staining, mitochondrial techniques, and silver impregnation demonstrate a progressive change in the chondriosomes from equally distributed filaments in the embryonic syncytium to the apical agglomeration of chondriosomes in the adult cells. The supra-nuclear "active" chondriosomes, and the vacuoles, both demonstrated by impregnation, do not change in location relative to the nucleus, during development.—*H. Hibbard*.

7112. BRIDGES, CALVIN B. Correspondences between linkage maps and salivary chromosome structure, as illustrated in the tip of the chromosome 2R of *Drosophila melanogaster*. *Cytologia, Fujii Jub. Vol.* 745-755. 1 fig. 1937.—Using the right end of chromosome 2R, the positions of regions and points on the genetic map have been located on the salivary gland chromosomes. For this study, 5 inversions, 2 translocations and 4 deficiencies were used, all of them having one or both breaks within the section from near the locus of "humpy" to the tip. The most useful type of aberration for this purpose is the deficiency, since it does not disturb notably the crossing-over frequency, and its location on the genetic map can be found by ordinary linkage tests. On the average, 4.2μ of chromosome distance equals one unit of map distance, but regional differences are noted; for instance, the distance $px-bw$ ($=4$ units) occupies only 7μ , an average of 1.75μ per unit. Regional differences in mutability also exist. For instance, from humpy to plexus $= 7.2$ units of map distance and 19μ of chromosome length, and from plexus to $M\ 33a = 7.5$ units and 18.5μ . But in the former section only 3 mutant loci are known, while in the latter there are 15. A low mutation rate is probably correlated with a large number of repeats. A recessive mutation would have to appear not only in a given locus but also in the repeat region before it could show out.—*R. E. Cleland*.

7113. CREW, F. A. E., and S. S. MUNRO. Gynandro-

morphism and lateral asymmetry in birds. *Proc. Roy. Soc. Edinburgh* 58(2): 114-134. 1 col. pl. 1938.—Four new cases of lateral color asymmetry in birds are recorded: a yellow/buff cock canary, a spangled/partridge Old English Game bantam hen, and 2 yellow/white fleshed F. I. cocks out of the mating Light Sussex hens by Rhode Island Red cocks. 4 new cases of gynandromorphism in birds are descr.: 2 in the Gouldian finch and 2 in the fowl. All the mosaic birds examined showed lateral differences in size, those in the fowl falling into 2 classes: one in which the difference in size between the 2 sides of the body was of the order of 2-4%, the other in which this difference was 10-15%. All cases so far reported in the literature probably belong to one of these classes. In the fowl the birds of the first class may be instances of the elimination of an autosome, those in class 2, cases of non-disjunction resulting in bilateral heteroploidy, there being a gain of an autosome on the larger side, its loss on the smaller. Such heteroploidy could provide a complete explanation of gynandromorphism in the fowl. The finches were ♀♀ with ♂ coloration on the slightly larger right side and ♀ on the smaller left. Implantation of estrin and testosterone crystals into normal Gouldian finches failed to affect the sex-dimorphic plumage colors; these are apparently purely genetically determined. Gynandromorphism in the finches, in spite of the fact that in them the lateral size difference is only of the order of 3-4%, is ascribed to non-disjunction. Spangling in the Old English Game is a monogenic autosomal recessive.—Lateral gynandromorphism in birds is always the result of an aberrant chromosome distribution, and is always associated with lateral size differences; and there are 3 types: The sparrow or finch type, in which the plumage characterization is genetically detd. and follows the aberrant lateral chromosome distribution; the fowl type, in which the sex-dimorphic plumage characterization is subject to hormonal regulation, so that bilaterality of plumage type is practically an impossibility; and the pheasant type, in which a nearly normal sex-type of plumage is found on one side of the body and an intersexual type on the other.—*F. A. E. Crew.*

7114. DANIEL, J. FRANK. The living egg-cell of *Triturus torosus*. *Cytologia, Fujii Jub. Vol.* 641-643. 2 fig. 1937.—Changes in size, shape and position of the egg during the 1st week of development are described.—*H. Hibbard.*

7115. FILHOL, J. Recherches sur la nature des lépidosomes et les phénomènes cytologiques de la sécrétion chez les Gastéropodes Pulmonés. III. Vésicules multifides et canal déférent. IV. Lépidosomes et parasomes. *Arch. Anat. Microsc. [Paris]* 34(3): 407-439. 7 fig. 1938.—III. The cytology of the mucus gland, an accessory ♀ gland absent in some gastropods but present as a simple tube or as a compound tubular structure in others, and of the sperm duct is descr. under varying conditions. Their embryological history, their seasonal secretory cycles, their appearance under exptl. conditions (e.g., castration, starvation, or artificial stimulation of hibernating animals), all show the lepidosomes to be a special category of chondriosomes.—IV. This section constitutes a general summary. The lepidosomes are visible alive and unstained; they may be stained vitally by Janus green, but not by neutral red; mitochondrial methods show them; metallic impregnations blacken them but with some deformation; histochemically they are lipo-proteic, rich in lipids. This indicates, not that the Golgi apparatus is lipoidal, but that these bodies are chondriosomal. They are in proximity to the vacuoles, yet are not the vacuoles; they are only quantitatively different from chondriosomes; they grow from chondriosomes originally and should be considered a special category of chondriosomes,—the "chondriome actif" of Parat. Pulmonates show an intermediate condition between the typical, polarized, vertebrate supranuclear zone of active filamentous chondriosomes and the typical unpolarized invertebrate cell with Golgi bodies (lepidosomes) scattered in the cytoplasm. The hibernation rest in pulmonates corresponds to a period of sexual repose, when a slowing or suppression of glandular activity occurs, with a corresponding reversible disappearance or alteration of lepidosomes.—*H. Hibbard.*

7116. HOVASSE, R. Nouvelles recherches sur les constituants cytoplasmiques des Volvocolles: les Chlamydo-

monadinées. *Bull. Soc. Zool. France* 63: 357-367. 18 fig. 1939.—In most cases the Volvocales show 4 distinct cytoplasmic constituents: plastids, chondriome, vacuome and Golgi zone. In 2 cases the Golgi zone disappears completely. Mitochondria and dictyosomes are distinct entities, the former being permanent, the latter disappearing during mitosis. They are not derived one from the other.—*R. Paulhan.*

7117. JEFFREY, EDWARD C., and EDWIN J. HAERTL. The nature of certain so-called sex chromosomes in *Ascaris*. *Cellule* 47(2): 237-244. 1 pl., 2 fig. 1938.—Corrections in the earlier accounts of spermatogenesis in *A. lumbricoides* and *A. canis*, supposedly of the XO-XX type, are made, which tend to disprove the existence of the sex chromosomes. Lagging chromosomes, usually called sex chromosomes, occur in both meiotic divisions. No proof is found for the XY-XX condition in *A. mystax*. Reference to parthenogenesis in aphids and in plants further indicates independence of the process from sex chromosomes. General doubt is cast on the whole idea of sex chromosomes.—*H. Hibbard.*

7118. KAUFMANN, B. P., and RUTH C. BATE. An X-ray induced intercalary duplication in *Drosophila* involving union of sister chromatids. *Proc. Nation. Acad. Sci. U.S.A.* 24: 368-371. 1938.—An intercalary mirror-imaged duplication ("reversed repeat") in the left limb of the 3d chromosome of *D. melanogaster* was found in the salivary glands of an F₁ larval ♀ descended from an irradiated father. Origin of the duplication is attributed to fusion at identical loci of the broken ends of 2 sister chromatids of the paternal 3d chromosome.—*J. B. Buck.*

7119. MAKINO, SAJIRO, EIJIRO NIYAMA, and J. J. ASANA. On the supernumerary chromosomes in the mole-cricket, *Gryllotalpa africana* de Beauvois from India. (A preliminary note.) *Jap. Jour. Genetics* 14(6): 272-277. 1938.—Among the 30 individuals obtained from around Bombay, 3 chromosome types were distinguished. The basic type may be designated as 22+X (♂), 22+XX (♀); all of the chromosomes are atelomitic, and 2 of them have a terminal trant. The 2d type has a small supernumerary chromosome and is 23+X (♂), 23+XX (♀). The 3d type has a pair of such chromosomes and is 24+X (♂), 24+XX (♀). The origin of such chromosomes, as well as of the different chromosome types, is considered.—*T. Komai.*

7120. MORGAN, T. H. The factors locating the first cleavage plane in the egg of *Chaetopterus*. *Cytologia, Fujii Jub. Vol.* 711-732. 56 fig. 1937.—An analysis of the causes of cleavage planes is attempted by modifying normal procedure by centrifuging. The dorso-ventral axis of the egg is determined before both maturation and fertilization. Prevention of polar body formation by keeping the eggs in the centrifuge, shows that the polar mitotic spindle does not of itself cause division of the egg. Evidence is presented to show that in *Chaetopterus* the entrance point of the sperm is not the determining factor in forming the embryo axis. Whether it is the enforced entrance of the sperm on a predetermined side of some eggs which causes the axis determination, or whether it merely agrees with it, is unknown.—*H. Hibbard.*

7121. OGUMA, KAN. Absence of the Y-chromosome in the vole, *Microtus montebelli* Edw., with supplementary remarks on the sex-chromosomes of *Eutamias* and *Apodemus*. *Cytologia, Fujii Jub. Vol.* 796-808. 1 pl., 3 fig. 1937.—The chromosome number is 31, of which 11 pairs are Vs. Each V may possibly be a multiple of 2 rods. This concept makes *M. montebelli* more nearly comparable with related species as to number. No Y exists in this species (nor in another vole and a field mouse), which are thus exceptions to the general XY makeup of Mammalia as claimed by Painter and by Mathey and Renaud.—*H. Hibbard.*

7122. SLACK, H. D. The association of non-homologous chromosomes in Corixidae (Hemiptera-Heteroptera). *Proc. Roy. Soc. Edinburgh* 58(2): 192-212. 1 pl., 9 fig. 1938.—Spermatogenesis was studied in 20 Scottish Corixidae. In 17—*Corixa dentipes*, *Sigara linnaei*, *S. striata*, *S. distincta*, *S. falleni*, *S. castanea*, *S. semistriata*, *S. fabricii*, *S. fossarum*, *S. scotti*, *S. germari*, *Callicorixa praeusta*, *C. wollastoni*, *C. caledonica*, *C. concinna* and *Glaenocorisca cavirostris*—it

kernels showed no correlation ($r = -0.0999 \pm 0.0387$). Accordingly the germination of grains does not depend upon size if the seeds are thick-grained, but upon wrinkledness. The germinated as well as the ungerminated grains arriving at the seedling stage in general must have embryos with ± 35 chromosomes and endosperm with the formula $3(AB) + (\pm D)$. The zygotic eliminations in plants with ± 35 chromosomes may be caused in part by the lethal nature of these grains.—P. D. Strausbaugh.

7131. MENDIOLA, N. B. A search for hidden and traumatic bud variations in sweet potato. *Philippine Agric.* 27(9): 726-754. 8 fig. 1939.—In an earlier paper, 1933, the author presented a new method of plant improvement based on artificial and hidden variations, to supplement the methods already in use. Additional evidences are here presented to show evidences of traumatic bud variations produced as a result of the wound caused by separating the petiole from the stem of the mother plant in the preparation of the leaf cuttings.—M. Manresa.

7132. MICZYNSKI JUN., K. Genetische Studien über die Phenolfarbenreaktion beim Weizen. *Zeitschr. Zücht. Reihe A. Pflanzenzücht.* 22(4): 564-587. 5 fig. 1938.—Simple inheritance studies, using 5 crosses, on awns and with kernel and glume color, confirmed previous results by others. Two, and 3, genes were responsible for kernel color. Phenol reaction of the kernel, resulting in increased color, was conditioned by 1, or by 2, genes but for glume reaction only 1 gene was discovered. No linkage was found between reaction of kernel or of glume to phenol and other characters studied. Complete linkage seemed to exist between glume reaction to phenol and 1 gene responsible for kernel reaction. The 2d gene mendelized independently. Using an extract from the glume, studies indicated that an oxidase causes phenol coloration.—L. R. Waldron.

7133. RHOADES, M. M., and VIRGINIA H. RHOADES. Genetic studies with factors in the tenth chromosome in maize. *Genetics* 24(2): 302-314. 1 pl. 1939.—Linkage data are presented which place the gene for resistance to rust (*Puccinia sorghi*) in the genetic map of chromosome 10. These data also determine the linear order and map position of the *li* and *d₁* loci. Two previously undescribed characters are reported. One of these, designated *sp₂* (small pollen), has a semilethal effect upon the σ and ρ gametophytes. Pollen grains carrying the *sp₂* factor do not differ visibly from normal grains except that they are smaller; yet 96.6% of *sp₂* grains are unable to compete successfully with normal pollen. 44% of *sp₂* eggs are infertile and do not develop into mature kernels. Crossing over is reduced in adjacent regions when *sp₂* is heterozygous. Linkage data place *sp₂* approx. 1 crossover unit to the left of *li*. Cytological studies at pachytene disclosed no chromosomal irregularity in $+$ *sp₂* plants. Linkage data are presented which locate the other new gene *ls* (luteus) between *li* and *g₁*. The linkage data extend the genetic map for chromosome 10 from 32 to 84 units. The sequence and map positions as determined from these data are

<i>Rp</i>	<i>sp₂</i>	<i>li</i>	<i>ls</i>	<i>g₁</i>	<i>R</i>	<i>d₁</i>
0	27	28	38	43	57	84

Earlier cytological observations had placed the *Rp* gene in the distal one-fourth of the short arm of chromosome 10 (V. H. Rhoades), and the *R* locus in the distal 22% of the long arm (Stadler).—M. M. Rhoades.

7134. SEARS, E. R. Amphidiploids in the Triticinae induced by colchicine. *Jour. Heredity* 30(2): 38-43. 4 fig. 1939.—Tetraploid sectors were found among sterile hybrids of *Triticum monococcum* \times *Aegilops uniariata*, *A. caudata* \times *A. umbellulata*, and *A. speloides* \times *A. umbellulata* after immersion of the germinating seeds in .05% aqueous soln. of colchicine for 24 hrs., followed by 6 hrs. immersion in water. These sectors, which involved up to $\frac{1}{4}$ of the plant, were σ and ρ fertile, and were further characterized only by larger and sparser stomata in the last-named 2 hybrids, and not even by stomatal differences in the other hybrid.—E. R. Sears.

ANIMAL (EXCEPT MAN)

7135. BREHME, KATHERINE SUYDAM. A study of the effect on development of "minute" mutations in *Drosophila melanogaster*. *Genetics* 24(2): 131-161. 1 pl.,

1 fig. 1939.—Heterozygous Minute flies were studied to ascertain the effects of Minute factors on development. The embryonic period of *Mw*, *MFla* and *MT²* zygotes is not prolonged; the larval period of *Mw* and *MFla* is prolonged 41-43 hrs., and the pupal period is prolonged 12-20 hrs. in comparison with the wild type at 25° C. *Mw*, *MFla* and *MT²* larvae pass through only the usual 3 larval instars. *Mw* and *MFla* larvae undergo the first moult at an average of 1 hr. later than their wild type sibs, and the 2d moult 3 hrs. later than the wild type. Although its developmental period is prolonged, the Minute fly is significantly smaller than the wild type, taking tibia length as an index of body size (*Mw*, *MFla* and *MT²*). Length of Minute and wild type larvae does not differ greatly at any age. At the time of puparium formation of the wild type, the Minute larvae are slightly shorter than wild type, and they increase in length until they form puparia. At 100 hrs. from oviposition, the Minute larvae are significantly smaller in width than the wild type. Larval growth is therefore affected by the Minute condition. Histological study shows that in *Mw* larvae certain of the thoracic imaginal disks and antennal disk are smaller and less advanced in differentiation than the wild type at 48 and 72 hrs. from hatching; the optic disks are smaller at 48 hrs. but at 72 hrs. no difference could be seen. There is thus an effect of the Minute condition upon imaginal growth. The histological observations are preliminary. The *Mw*, *MT²* and the majority of the *MFla* homozygotes die during the 1st instar; they grow only very slightly and do not moult. A small proportion of the *MFla* homozygotes die in the late embryonic stage.—K. S. Brehme.

7136. BRUCKNER, J. H. The inheritance of melanism in pheasants. *Jour. Heredity* 30(2): 45-52. 2 fig. 1939.—Melanism in *Phasianus* is due to a single, autosomal, incompletely dominant factor, *M*. This is shown by the ratios observed in 254 *F₁*, 197 back-cross and 177 *F₂* pheasants following crosses involving melanistic and ringneck pheasants. Birds heterozygous for *M* closely resemble *P. versicolor*. Theories relative to the origin of the "melanistic mutant" pheasants and the possible relation of these birds to *P. versicolor* are discussed.—J. H. Bruckner.

7137. CHINO, MITSUSHIGE. Miniature 9, a new mutable gene of *Drosophila virilis*. (A preliminary note.) *Jap. Jour. Genetics* 14(6): 285-286. 1938.—The new gene belongs to the same type as *mt-a* and *mt²-a* reported by Demerec, and mutates frequently (the mutability amounting to 33.7%) to the wild type. The mutation occurs either in the germ cells of both sexes or in the somatic cells.—T. Komai.

7138. DEMEREC, M., and MARGARET E. HOOVER. Hairy wing—a duplication in *Drosophila melanogaster*. *Genetics* 24(2): 271-277. 1 pl. 1939.—A study of salivary gland chromosomes indicates that in the *Hw* chromosome the band 1 B 1.2 is represented twice. Genetic evidence shows that flies carrying duplication for the tip of the X-chromosome, where both the band 1 B 1.2 and *Hw* are located, exhibit certain characteristics of hairy wing. Thus, it is concluded that the dominant *Hw* character is a duplication for the 1 B 1.2 band. Data suggest that this band represents achaete locus and also that the phenotypic effect is stronger if 2 of these bands are located in 1 chromosome than if they are distributed between 2 chromosomes.—M. Demerec.

7139. FREEMAN, V. A. Variations in the number of vertebrae of swine. *Jour. Heredity* 30(2): 61-64. 2 fig. 1939.—Considerable variation exists in the number of ribs, thoracic vertebrae and lumbar vertebrae of pigs. Some strains of certain breeds inherit, on the average, larger numbers of vertebrae than others, but the variation existed in each of the 5 breeds examined. The variation is about the same in each sex. The number of ribs appears to be influenced by more than one pair of genes. Carcasses with 21 and 22 body vertebrae were longer than carcasses of similar breeding with 20 body vertebrae. Evidence is presented that selection for body length by the usual method may have resulted in some increase in the number of body vertebrae.—V. A. Freeman.

7140. GRUHN, RUTH. Über den Einfluss von Inzucht und Selektion auf das Erbreinwerden von Tierbeständen.

Zeitschr. Zücht. Reihe B: Tierzücht. u. Züchtungsbiol. 43 (1): 1-61. 1939.—The rate at which homozygosis in a population is increased by inbreeding and selection combined was studied by Mendelian methods. The results with one factor pair are compared with those for 2 factor pairs but the initial population is assumed to be entirely heterozygous, complete dominance is assumed, environmental complications which would cause mistakes in selection are ignored, and linkage is only mentioned as a complication yet to be studied. The formulae are complicated and their validity in other conditions than the special cases for which they were derived is uncertain. Wright's papers since 1930 dealing with the joint effects of selection and inbreeding on the distribution of gene frequencies are not mentioned. The general conclusion is that increase in homozygosis under selection combined with inbreeding is faster than under either one alone but that the time required for selection to produce a given increase in homozygosis increases linearly with the number of pairs of genes concerned. Extending Berge's earlier work, the numbers of offspring required for equally adequate progeny tests of an individual suspected of being heterozygous for dominant characters are compared for the 4 cases when the individual being tested is mated to: (1) homozygous recessives, (2) known heterozygotes, (3) its full sibs, and (4) its offspring. For 2 pairs of genes and under the most favorable conditions, the numbers of offspring required to make the probability of heterozygosis less than .01 are 9, 21, 33, and 45, respectively. In the latter 2 methods the number required varies according to whether the offspring are all half sibs or include many sets of full sibs. Simultaneous testing for 2 pairs of genes requires only slightly larger numbers than testing for 1 pair. In practical applications it is proposed that breeders attack the problem by a tandem method, selecting and fixing the genes 2 pairs at a time. The lengths of generations quoted are more nearly minima than averages.—*J. L. Lush.*

7141. HELFER, R. G. Dominance modifiers of Scute in *Drosophila pseudoobscura*. *Genetics* 24(2): 278-301. 1939.—The reactions of various strains of race A and B of *D. pseudoobscura* to the semi-dominant mutation Scute were studied. Some strains gave high bristle numbers in hybrids with this mutant, others gave low bristle numbers, while still others were intermediate. No relation was found to exist between the degree of dominance of Scute in hybrids with a given strain and its geographical origin. In some of the wild strains the results suggest the existence of modifiers in the Y-chromosome. In other strains the X-chromosomes appear to contain modifiers of the dominance of Scute. No significant differences were found between the Scute alleles of several widely different strains tested. A more thorough analysis of 2 strains with high bristle numbers and 2 others with low bristle numbers showed the main differences in their reactions to Scute to be due to the presence of modifying genes located at random in their autosomes. The pattern in which Scute removes bristles is not significantly altered in hybrids with different strains. A final test showed that the effects produced by these modifiers seem to be specific for the Scute gene.—*R. G. Helfer.*

7142. HORTON, IRA H. A comparison of the salivary gland chromosomes of *Drosophila melanogaster* and *D. simulans*. *Genetics* 24(2): 234-243. 14 fig. 1939.—In hybrid larvae 10 visible chromosome rearrangements have been found and evidence for about 14 other minute changes is presented, making a total of 24 rearrangements since the 2 species came from a common stem. Of the visible changes, 6 are inversions, 5 of which are short and hitherto unreported, and 4 involve changes in the free tips of chromosomes X, III, IIR, and IV, and presumably are due to translocations. An inverted band will occasionally synapse with its homologue, but ordinarily somatic synapsis is prevented for some distance on either side of the break.—*I. H. Horton.*

7143. JENNINGS, H. S. Genetics of *Paramecium bursaria*. I. Mating types and groups, their interrelations and distribution; mating behavior and self sterility. *Genetics* 24(2): 202-233. 7 fig. 1939.—Ordinarily, members of a single clone in *P. bursaria* do not conjugate together, but when

2 clones are mixed, in some mixtures the individuals clump into dense masses, later emerging as conjugating pairs; in other mixtures clumping and pairing do not occur. The mating behavior is described and illustrated. There are 2 main factors: a coordinated reaction of 2 individuals that come in contact; and a physical adhesion between bodies that touch. Clones that do not clump and pair together are of the same mating type; those that do, of different types. 16 diverse mating types are found to exist, in 3 groups. Group I contains 4 mating types, group II 8 types, group III 4 types. The members of any single type may mate with those of any of the other types of the same group, but members of different groups do not intercross. The occurrence and distribution in the U. S. of the 3 groups and 16 types are described. Rarely self fertilization occurs within a clone. The relation of the phenomena to multipolar sex and to self sterility is discussed.—*H. S. Jennings.*

7144. JOLLOS, VICTOR. Further tests of the rôle of cosmic radiation in the production of mutations in *Drosophila melanogaster*. *Genetics* 24(2): 113-130. 1939.—Cultures of 2 inbred stocks were exposed to various intensities of cosmic radiation, to determine whether there is a quantitative relation between intensities of cosmic radiation and frequencies of "spontaneous" mutations. The stocks were kept at Madison, Wis., under ordinary conditions and under 18 mm. of lead, and at an altitude of about 14,000 feet (Pike's Peak, Colorado) without lead and under 18 mm. of lead. The frequencies of cosmic radiation at the high altitude are about 5 times as great as at Madison altitude. The Pb cover is assumed to increase the frequencies of secondary radiation about 3 times. The frequencies of lethal and semi-lethal sex-linked mutations in the cultures kept at Madison under Pb were 1.33 times as high as those in the cultures which were left under ordinary conditions. Exposures at the high altitude without the Pb, or under Pb, were followed by a 1.51- and 3.22-fold increase in the mutation rate respectively. On the basis of these figures, not more than 15.79% of the "spontaneous" mutations found at Madison (under ordinary conditions) would be related to the influence of cosmic radiation. The results seem to indicate that the mutation rate increases in linear proportion to the increase in cosmic radiation intensities. The equation of this line would be $0.843 + (0.157 \times \text{increase in cosmic radiation intensities})$. The biological as well as the physical data for these calculations are not yet sufficiently exact. Thus the figure 15.79 might have to be replaced by another one between 5.75 and 28.29, probably by one much closer to 5.75.—*V. Jollos.*

7145. KALISS, NATHAN. The effect on development of a lethal deficiency in *Drosophila melanogaster*: with a description of the normal embryo at the time of hatching. *Genetics* 24(2): 244-270. 2 pl. 1939.—A study of the effects on development of a recessive lethal deficiency of the left end of the X chromosome revealed the following: The deficiency, which has at least the loci yellow and achaete (but not scute) missing, is lethal when hemizygous. Hemizygous ♂♂ develop as fully formed larvae, but fail to hatch from the egg. The lethal embryos are characterized by a general debility and the erratic distribution of gas in the tracheae. Histomorphologically they can not be distinguished from normal embryos of the same age. The pigmentation of the mouth armature and cuticular spines is "yellow-type," supporting Muller's classification of the yellow locus as hypomorphic. Mutants that are placed on suitable media may live on for 70-80 hrs. without further growth or differentiation.—*N. Kaliss.*

7146. KAWAGUCHI, EISAKU. Genetic constitutions of the mosaic silkworms and their bearing to insect embryology. *Jap. Jour. Genetics* 14(6): 262-263. 1938.—Mosaic worms were obtained by centrifuging eggs directly before or after fertilization. The mosaics may be classified into dorso-ventral, lateral, ventral-lateral (dorsal side normal), dorsal-lateral (ventral side normal), and irregular types. The genetic constitutions of their gonads were determined by breeding tests. The germ cells have always identical genetic constitution with the ventral side, if this side is not mosaic, otherwise, they have genetic constitutions corresponding with either the dominant or recessive type, or both types mixed; the germ cells never represent the constitution of

the dorsal side. These facts apparently show, that (1) the germ cells and the somatic cells on the ventral side have a common origin; (2) the Keimbahnplasm is located on one side of the median line of the ventral plate, and (3) the primordial germ cells are more than one, at least 20.—*T. Komai.*

7147. KOHMURA, TAIJI. Die Veredelung des mongolischen Schafes. Kreuzungsversuche am mongolischen Festschwanzschaf mit dem Rambouilletmerino in besonderer Rücksicht auf die Vererbung der Wollcharaktere und des Wollertrags. 75p. 19 pl. Maruzen and Co.: Tokyo, 1938.—Expts. conducted at Kung-Chuling, Manchuria, from 1914 to 1929 and involving the birth of 1573 lambs are reported. A single factor difference is postulated between the Rambouillet type fleeces, which are entirely free from hairiness, and the mixed-wool type, typical of the mongolian sheep, and consisting of a mixture of wool and hair fibers. The mixed-wool type is dominant. Three sub-types are found among the mixed-wool fleeces, the classification being made on the basis of degree of hairiness, and this is conditioned by 2 pairs of factors, apparently additive in effect. The different fleece types can be identified in new-born lambs as well as in mature sheep. Annual shedding of the fleece is characteristic of the mongolian sheep but not of the Rambouillet. This is a heritable character, apparently dependent on a single gene, and with shedding dominant to non-shedding. Wool yield is dependent on many factors. The average shearing fleece weights for the females were: Rambouillet 4.99 kg.; mongolian 1.31 kg.; F_1 2.46 kg.; mixed-wool type backcross progeny ($F_1 \text{ } \sigma \times \text{Rambouillet } \sigma$) 3.26 kg.; Rambouillet type backcross progeny ($F_1 \text{ } \sigma \times \text{Rambouillet } \sigma$) 3.44 kg.—*K. Rasmussen.*

7148. KOMAI, TAKU, and TAKESI TAKAKU. On an inversion in the X-chromosome of *Drosophila virilis*, especially its effect on non-disjunction. (A preliminary note.) *Jap. Jour. Genetics* 14(6): 253-256. 1938.—The inversion induced by X-ray treatment is lethal in the σ and also in the homozygous f , but gives no visible effect in the heterozygous f . The crossing over between f and bb is suppressed considerably. The salivary gland examination shows that the basal $\frac{2}{3}$ of X is inverted. The primary exceptions rise to nearly 13 times, the secondary exceptions to nearly 10 times, the ordinary cases in both sexes. A few bb flies appeared among the secondary exceptions, indicating that XXY-O division had occurred. Superfemales were also obtained in relatively large numbers.—*T. Komai.*

7149. LAW, L. W. Tests for the eye-color hormones of *Drosophila* in other insects. *Proc. Soc. Exp. Biol. and Med.* 40(3): 442-445. 1939.—Feeding tests of larval and pupal tissues of representatives of most of the insect orders have shown that the v^+ and cn^+ eye-color hormones of *Drosophila* are widely distributed throughout the insect group. All tissues giving a test for v^+ hormone gave corresponding tests for the cn^+ hormone. In all cross-comparable tests the test for v^+ hormone was stronger than the test for cn^+ hormone.—*L. W. Law.*

7150. MacKNIGHT, R. H. The sex-determining mechanism of *Drosophila miranda*. *Genetics* 24(2): 180-201. 2 fig. 1939.—*D. miranda* is closely similar to *D. pseudoobscura*, differing chiefly in the structure of its sex chromosomes. In salivaries the Y is seen to be composed in part of a number of short euchromatic sections, most of which are attached at both ends to the chromocenter. Also present are a V-shaped X^1 and a rod-shaped X^2 . The euchromatin of Y is considered homologous to that of X^2 , though much rearranged. X^2 is homologous (Dobzhansky and Tan, 1936) to an autosome, III, of *pseudoobscura*. Deleterious mutations (recessives or deficiencies) are present at at least 2 loci in the euchromatin of the Y.—*R. H. MacKnight.*

7151. MORIWAKI, DAIGORO. Enhanced crossing over in the second chromosome of *Drosophila ananassae*. (A preliminary note.) *Jap. Jour. Genetics* 14(6): 283-284. 1938.—The crossing-over modifier closely linked with M-IIb is located on the right arm of the second chromosome, and enhances the crossing over between the genes in this chromosome in both sexes. In this chromosome all the mutant genes discovered, except M-IIb and the crossing-over enhancer, are located on the left arm, though in the alivary figures the 2 arms show very similar patterns.—*T. Komai.*

7152. MOROHOSI, SEIZIRO. Transplantation of optic discs and eye colors in *Bombyx mori*. *Jap. Jour. Genetics* 14(5): 204-210. 1938.—In *Bombyx mori*, as in *Drosophila*, larval optic discs could be successfully transplanted to different larval hosts. The results may be summarized as follows:

Host	Implant	Phenotype of Implant
Black	White	Black
Black	Red	Black
Red	White	Red
Red	Black	Black
White	White	White
White	Red	Red
White	Black	Black

From these results one may postulate the presence of the r^+ substance in black type, in addition to the W (w^+) substance whose existence has been postulated by Kikkawa ('37) and Kawaguchi and Kin ('37, '38). The r^+ substance acts only in the presence of W gene. Implanted eye discs usually show deeper pigmentation in the female hosts than in the male. During the course of the expts. some fragmental eyes were found. When such fragments are present besides a seemingly entire eye in the same host, the former show usually lighter color than the latter.—*Author.*

7153. QUINN, JOSEPH P. Sexual dimorphism in down and adult plumage of the Pilgrim goose. *Jour. Heredity* 30(2): 55-57. 2 fig. 1939.—Sexually dimorphic geese which appear to be identical with the sexually dimorphic geese recently found in Alabama are described. These geese have been given the breed designation of Pilgrim geese and are noteworthy because of the easy identification of the sexes at any stage of development.—*J. P. Quinn.*

7154. STEINBERG, ARTHUR G., and ELIZABETH C. WHITE. The failure of host genotype to affect crossing-over in an implanted ovary in *Drosophila melanogaster*. *Amer. Nat.* 73(744): 91-93. 1939.—Ovaries from mature f larvae heterozygous for the X-chromosome mutants yellow and echinus were implanted into mature f larvae heterozygous for the Curly and Payne inversions (chromosomes II and III respectively). (These inversions cause a 285% increase in crossing-over between the yellow and echinus loci.) Crossing-over was measured in the implanted ovaries. A total of 403 offspring showed 3.7% of crossing-over. The control value (based on 5088 flies) was 3.3%. Comparison of the test and control cross-over values failed to show a significant difference ($D=0.4 \pm 0.3$).—*A. G. Steinberg.*

7155. STERN, CURT. Somatic crossing-over and somatic translocations. *Amer. Nat.* 73(744): 95-96. 1939.—Jones has suggested that mosaic spots in *Drosophila*, which Stern has described as products of somatic crossing-over, are the rare survivors of a process of random exchange, homologous or non-homologous. The author's evidence indicates that in *Drosophila*, cells which through somatic crossing-over receive unbalanced chromosomal complements may live; the rare occurrence of such cells is strong indication that somatic exchanges in *Drosophila* occur generally at homologous loci.—*J. Neel.*

7156. STERN, CURT, and ERNST HADORN. The relation between the color of testes and vasa efferentia in *Drosophila*. *Genetics* 24(2): 162-179. 9 fig. 1939.—In *D. melanogaster* adults the vasa efferentia have the same color as the gonads. Reciprocal testis transplantations between races with pigmented and unpigmented gonads show that the vasa assume the color of the attached testes, whether they be of host or donor origin. When a compound host-donor testis becomes attached to one vas, both the testis and vas show irregular, sharply outlined spots of pigment. Vasa of hosts in which the donor testis is present, but unattached, never show donor testis coloration. The sharply outlined pigment spots found in compounds make an explanation based on the assumption of a diffusible substance unlikely. However, a histological study of the pupal development of testes and vasa efferentia shows that although otherwise of independent origin, the vasa obtain their external epithelial covering by a migration of the external covering cells from the testes. Corresponding results appeared in transplantations involving *D. pseudoobscura*

(expts. of Dobzhansky), *D. virilis*, and *D. azteca*.—H. D. Stalker.

7157. SUZUKI, KANICHIRO. On the linkage between two white-egg genes in *Bombyx mori*. (A preliminary note.) *Jap. Jour. Genetics* 14(6): 263. 1938.—The genetic constitution of the line of white-egg which shows maternal inheritance may be designated as w_1W_2PR , while that of the line of white-egg which shows ordinary inheritance may be represented as W_1w_2PR . W_1 seems to be concerned with the production of a hormone-like substance and W_2 (together with PR) determines the formation of pigment. They act as complementary genes for the production of the egg and eye color, and are closely linked together, there being about 3.5% recombinations between them.—T. Komai.

7158. TAZIMA, YATARO. Genetical and cytological proofs of attached chromosomes in *Bombyx mori*. *Jap. Jour. Genetics* 14(5): 191-203. 1 pl. 1938.—Between P and P^{aa}, non-disjunction occurs occasionally. In such cases the union of the 2 genes is so firm that they remain united permanently. A probable explanation of such 100% non-disjunction is the attachment of two 2d chromosomes. This explanation was tested genetically and cytologically. It is assumed that in the attached strains crossing over occurs in the ♀ with a frequency of 0.2-0.3%. Several polyploid individuals were obtained during the expt.—Y. Tazima.

7159. UMEYA, YOSHICHIRO. A consideration on the pigmentation of eye and egg in the silkworm. (A preliminary note.) *Jap. Jour. Genetics* 14(6): 278-281. 1938.—The effect of ovarian transplantation on the pigmentation of the eye and egg was examined on various races having different kinds of eye- and egg colors. The ovary of the host was removed or allowed to remain together with the implant. The effect of the implant on the egg color varies considerably with the races used. It is especially marked on the 2 white-egg races, and less marked on the orange-egg race. The eggs of the former races are changed into slaty color by the presence of the ovary of the black-egg race; the eggs of the orange race only become dark brown. For other combinations negative results were obtained. The author postulates the existence of racial differences in the amt. of chromogen substance and of hormone-like substance.—T. Komai.

7160. YAMANE, JINSHIN, KISAJIRO OGURA, and NORIYOSI MAKITA. Immuno-genetical studies on the interracial hybrid of the Formosan masked pig and Berkshire. *Jap. Jour. Genetics* 14(5): 211-232. 2 pl. 1938.—The Formosan masked pig, Tohen, which is considered to be a branch of the South-Chinese masked pig, can hardly be distinguished from Berkshire in the form of the skull. Immunological tests show that the erythrocytes of the 2 races are different; the erythrocyte of the masked pig contains a specific substance, distinct from that which is common to it and the Berkshire; the latter breed has no substance peculiar to it. Thus the erythrocytes of the 2 races may be designated as TB (for the masked) and tB (for Berkshire). This peculiarity is inherited on the Mendelian monohybrid basis, TB being dominant to tB.—T. Komai.

MAN

7161. COCKAYNE, E. A. The genetics of transposition of the viscera. *Quart. Jour. Med.* 7(27): 479-493. 1938.—Transposition of the viscera consists in the formation of a sinistral instead of a dextral spiral. It is inherited as a recessive determined by 1 autosomal gene. Proof is based on its distribution within a family. Usually it affects only one member of a fraternity. The parents, children, and half-sibs of those affected are almost invariably normal. The data are insufficient for genetical analysis, but the ratio of affected to normal members of fraternities is similar to that expected of a recessive. There is a high rate of first cousin marriages in parents (6 in 52 consecutive cases). There is a slight excess of ♂♂, but the great excess in published cases is probably fallacious. The incidence of congenital morbus cordis is abnormally high in complete transposition and still higher in incomplete transposition of the viscera. There is insufficient evidence to prove whether incomplete transposition is determined by the same gene, but reasons are given to show that this is probable.—E. A. Cockayne.

7162. FRANCESCHETTI, A. Vererbung und Auge. (Heredity and the eye.) *Zeitschr. Augenheilk.* 94:329-341. 1938.—The author quotes about a hundred pertinent works from various countries.—P. L. Krieger (courtesy of Psych. Abst.).

7163. SNYDER, L. H. Present trends in the study of human inheritance. *Eugenical News* 23: 61-66. 1938.—In his presidential address to the 26th annual meeting of the Eugenics Research Association, the author presented the salient facts and recommendations of the National Research Council Committee on Human Inheritance. They included: construction of maps of the human chromosomes to launch an effective intensive attack on linkage in man; search for new genetic factors in man through study of deficiencies of taste, color perception, odor, etc.; elaboration of further gene-frequency techniques and other statistical methods for the analysis of hereditary human factors; determination of the phenotypic frequency of various traits in the population; establishment of twin clinics at qualified hospitals under direction of competent physicians and geneticists; a carefully planned systematic attack on the problems of the inheritance of so-called "mental" traits in man; and miscellaneous activities which would include recording of important human family histories in the most useful form and the expansion or extension of the program as circumstances may dictate.—M. V. Louden (courtesy of Psych. Abst.).

7164. STRANDSKOV, HERLUF H. Inheritance of absence of thumb nails. *Jour. Heredity* 30(2): 53-54. 2 fig. 1939.—A 3 generation pedigree is given. This and other published pedigrees suggest a single dominant gene as the causative factor but data are insufficient to justify definite conclusions.—L. M. Dickerson.

7165. WÜLKER, H. Ausleseforschung (1). *Fortschr. Erbp. Rassenhyg. u. ihrer Grenzgebiete* 1(1): 22-36. 1937.—A review of recent papers on racial degeneration in Germany.

BIOMETRY

JOHN W. GOWEN, *Editor*

(See also in this issue Entries 7525, 8544)

7166. BAKER, G. A. The probability that the standard deviation of a second sample will differ from the standard deviation of a first sample by a certain multiple of the standard deviation of the first sample. *Metron* 13(3): 49-53. 1938.—Let x be the standard deviation of a first sample of n_1 from a normal population, y that of a second sample of n_2 . The distribution of $v = (x-y)/x$ is

$$\frac{(1-v)^{n_2-2}}{\left[\frac{n_2}{n_1} (1-v)^2 + 1 \right]^{\frac{n_1+n_2-2}{2}}}$$

which, for $n_1 = n_2 = n$, becomes

$$\frac{(1-v)^{n-2}}{[(1-v)^2 + 1]^{n-1}}$$

—E. S. Allen.

7167. CISBANI, RENZO. Contributi alla teoria delle medie. II. [Contributions to the theory of means.] *Metron* 13(3): 3-20. 1938.—By the n th order continuous weighted mean of the integrable, increasing, positive function $f(t)$ is meant

$$\left[\int_a^b \{f(t)\}^n \Theta(t) dt / \int_a^b \Theta(t) dt \right]^{\frac{1}{n}},$$

Θ being the weight function. For discrete means the definition is similar. Cisbani finds conditions that this mean lies between the maximum and minimum of $f(x)$. For instance, a sufficient condition is that

$$\int_a^b \Theta(t) dt \geq 0 \text{ and } \int_t^b \Theta(t) dt \geq 0$$

for every τ between a and b . "Disconnected" series of

categories are those with no natural order, either linear or cyclic. Cisbani's final section (completed by Guido Zappa after the author's death) extends the concept of arithmetic mean to such series. Perpendicular axes in s -dimensional space are assigned to the s categories. To the point of each at unit distance from the origin a weight is attributed, equal to the relative frequency f_i of the class. The center of gravity of the resulting system—with coordinates equal to these frequencies—has the usual properties of the arithmetic mean. A relative index of inequality of distribution is

$$C = \sqrt{\sum \left(f_i - \frac{1}{s} \right)^2 \frac{s}{s-1}}$$

—E. S. Allen.

7168. DUNLAP, J. W. Recent advances in statistical theory and applications. *Amer. Jour. Psychol.* 51: 558-571. 1938.—Evaluation of papers making statistical contributions, summarized under nine headings: correlation, analysis of variance, reliability, sampling theory, nomographs, statistics of matching, test construction, typology, and factor analysis.—D. E. Johansson (courtesy of *Psych. Abst.*).

7169. ELDERTON, W. P. Frequency curves and correlation. 3rd ed. xi+271p. University Press: Cambridge, England; Macmillan Co.: New York, 1938. Pr. \$3.75.—A revised edition of this text of curve-fitting and correlation, which was originally planned for the actuarial profession. In the main body of the book are 13 chapters devoted to: introduction, frequency distributions, method of moments, Pearson's system of frequency curves, calculation, comparison of various systems of curves, correlation, theoretical distributions and spurious correlations, correlation of characters not quantitatively measurable, standard errors, the test of goodness of fit, the correlation ratio, partial correlation. An appendix of 9 parts is included to provide a briefer course for those interested only in "a knowledge of correlation and probable errors." A list of references and a series of tables are included.—J. McV. Hunt (courtesy of *Psych. Abst.*).

7170. GINI, CORRADO, e GUIDO ZAPPA. Sulle proprietà delle medie potenziate e combinatorie. [On the properties of potentiated and combinatorial means.] *Metron* 13(3): 21-31. 1938.—The authors consider various means which had been studied in Gini's "Di una formula comprensiva delle medie" [see B. A. 12(5): Entry 7475]. They determine the effect (increase or decrease) of the increase of various parameters involved in their definition.—E. S. Allen.

7171. IMMER, F. R. Correlation between means and standard deviations in field experiments. *Jour. Amer. Statist. Assoc.* 32(199): 525-531. 1937.—An inherent negative correlation exists generally between the mean yield of plats and the standard deviation of samples within such plats for uniformity trial data from field expts. The mean yields and standard deviations of vars. or strains of crop plants tested in replicated field expts. are essentially independent; very little correlation can be expected between means and standard errors of different expts. conducted in different yrs. or in different parts of Minnesota under the exptl. conditions. Consequently, the standard deviation in bushels per acre as calculated from the separate tests would seem to be a more satisfactory measure of variability than the standard error expressed in percentage of the mean. Only in comparisons of the average of the means and standard deviations of 3 different crops would the coefficient of variability be preferred.—*Courtesy Exp. Sta. Rec.*

7172. PATERSON, D. D. Statistical technique in agricultural research. ix+263p. McGraw-Hill Book Co., Inc.: New York, 1939. Pr. \$3.—This volume aims to supply workers who are interested in statistics solely as an aid to research with appropriate statistical formulas to make the interpretation of their results purely routine operations. The subject is developed through discussion of short, well chosen examples of statistical analysis. The subject matter is divided into 9 chapters. The first chapter deals with means, variation in data and the significance of means as indicated by the concept of error. Both small samples and large samples are included. Variance analysis in small samples is then developed, F , z and t tests coming in for discussion. Chi-square tests and contingency problems are taken up in the 3d chapter. Diagrams of variation and correlation, calculation of the inter-dependence of 2 or more variables and the functions showing these interrelations occupy the 3 following chapters. The last 3 chapters deal with the arrangement and interpretation of expts.—chiefly of the crop or field type. Tables for estimating the significance of specific results are appended.—J. W. Gowen.

7173. SAWKINS, DANSIE T. The use of cumulative graphs for estimation of means, higher moments, etc. *Metron* 13(3): 33-47. 1938.—Directions are given for the graphic determination of mode, median, mean, and higher moments, use being made of the cumulative frequency graph.—E. S. Allen.

ECOLOGY

Editors

W. C. ALLEE, *General Animal Ecology*
G. D. FULLER, *General Plant Ecology*
CHANCEY JUDAY, *Hydrobiology (Oceanography, Limnology)*

FREDERICK A. DAVIDSON, *Ecology of Wildlife Management—Aquatic*
W. L. McATEE, *Ecology of Wildlife Management—Terrestrial*

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Seashore invertebrates of Pacific N. America, 7072; Physiol. adaptation of man to high altitude, 7531; Aggregation in tadpoles, 7615; Human population growth, 8309; Frost as related to air movement, 8492; Ants of forests, Germany, 8521; Insects of felled poplar, 8653; Zoogeography of Naiades, 8743, 8744; Ecology of snails, 8745, 8747; Temp. as affecting wing movement in insects, 8762; Mammals of Mongolia, 8854; Adaptations in field mice, 8860; Lemmings eaten by owls, 8866. [PLANT ECOLOGY]: Phytogeography of lichens, 8414; Vegetation of Macedonia and Thrace, 8444; Seed germination in fescues, 8467; Soil deterioration, western Canada, 8479; Soil colorimetry, 8488; Frost damage in citrus, 8517; Forest vegetation, Italy, 8533; Phytoclimatic zones, Italy, 8540; Ca content in plant, 8566)

GENERAL

7174. HANSON, HERBERT C. Ecology in agriculture. *Ecology* 20(2): 111-117. 1939.—Permanent agriculture must be in adjustment with the environment. The U. S. is passing from its pioneering stage into more advanced stages. In too many regions, however, pioneering or invasion will be repeated, but it is hoped that it will be based upon sounder knowledge of the environment. Stabilization of agriculture to the environment requires the services of scientists in many fields. The special contribution of ecology is to ferret out relationships with the environment so that man, using this knowledge in conjunction with that obtained from other fields, can strive intelligently to secure balance and stabilization, a goal essential for the attainment of the "abundant life" and the building of a culture far beyond our present dreams.—H. C. Hanson.

7175. SMITH, G. E. P. The physiography of Arizona valleys and the occurrence of ground-water. *Arizona Agric. Exp. Sta. Tech. Bull.* 77. 41-91. 3 pl., 26 fig. 1938.—This bulletin describes the physiography of Arizona valleys, including the natural surface features and the character and origin of the underlying valley fill; indicates the location, storage characteristics, and availability of the ground-water supplies in general; and shows the relationship of the physiography to the important supplies. "Although the topography of the bottom lands, the slopes, and the foothills appears to be accidental and haphazard, it is found on analysis to be definitely regular and understandable. Based on a knowledge of the origin and history of the natural surface features, a great deal can be foretold about the water storage capacity and the safe yield of the underlying formations." The importance, in relation to the Arizona ground-water law, of a distinction between "percolating" waters and waters "flowing in definite underground channels" is noted, and the basis for such a distinction is provided.—*Courtesy Exp. Sta. Rec.*

ANIMAL

7182. ADENSAMER, W. Stammesgeschichtliche und tiergeographische Erörterung über ostalpine Faunenelemente. *Zool. Anz.* 124(5/6): 111-129. 4 maps. 1938.—Whether high alpine forms have persisted in the east Alps through the glacial periods or have retreated into the Alps since the last glaciation from a general mid-European distribution is a still unanswered question. The distribution of certain boreo-alpine gastropods indicates that they are relicts of a fauna which had a much wider distribution before the last glaciation. The maps presented show that the northern and southern parts of the east Alps (Austria) have a much richer high alpine fauna (snails, beetles) than the central parts and that in fact the distribution of these animals corresponds to the regions of eternal snow during glacial times. The most acceptable explanation is that this fauna, which includes very old and primitive forms, had always lived in alpine heights during or even before the ice ages. An example is the snail *Cylindrus obtusus*, belonging to the very old subfamily Helicigona of which preglacial alpine types are known from fossils, and which have changed but little. Probably this alpine relict fauna lived during glacial times chiefly on projecting ridges, ledges, pinnacles, etc., which became free from snow during summer. On the other hand, the distribution of the spp., vars., and races of

the lower alpine snails of the genera *Helicigona* and *Orcula* indicates that such forms occupied subalpine regions during glacial times and have penetrated into the central Alps since the last glaciation. These postglacially invader forms occupy areas not inhabited by the relict forms. Certain types such as helioid snails of the section *Filicinella* spreading northwestward from southeastern Europe met an invincible barrier in the high Alps especially during glaciation.—L. H. Hyman.

7183. ALLEE, W. C., and JANET WILDER. Group protection for *Euplanaria dorocephala* from ultra-violet radiation. *Physiol. Zool.* 12(2): 110-135. 1 fig. 1939.—Other things being equal, these planarians survive lethal exposures to u.v. irradiation better if irradiated in numbers rather than singly and if after irradiation together, half of the individuals are grouped while the other half are isolated. In all instances survival was tested in fresh, non-irradiated water into which the grouped and isolated worms were transferred alternately. The group effect was apparent when worms were placed (a) in equal volumes or (b) in volumes proportional to numbers providing surfaces were equal and depth unequal but not if surfaces were unequal and depth was equal. An artificial increase in CO₂ to simulate a probable condition in water about the grouped worms, delays cytolysis following irradiation. Agitation of the worms (and the containing water) hastens cytolysis in the grouped animals only which causes the usual differential survival of grouped and isolated worms to disappear. This indicates the importance of some volatile substance, probably CO₂, as an agent retarding cytolysis. As supporting evidence, when waters rich in carbonate are made slightly acid, contained planarians after irradiation live longer than in similar but slightly alkaline water. In carbonate-free well water, pH is apparently an effective factor; under these conditions survival is longer in the lower H-ion conc. Irradiation increases the permeability of these worms to contained electrolytes if they are assayed in hypotonic water. This effect is not found in water with a conductivity of 3.2×10^{-4} mhos or more. As little as 0.000001 M CaCl₂ in double distilled water delays cytolysis. Grouped planarians assayed, after irradiation, in distilled water, probably give off enough more Ca than do isolated animals to account for the observed group protection. This is probably not effective in water which is already fairly rich in Ca. With other factors controlled, length of survival is directly related to the total electrolytic concentration of the water; in distilled water planarians increase this conc. and do so more rapidly after irradiation. Loss of electrolytes into waters of higher conductivity has not been shown. The evidence at hand does not permit a precise delimitation of the rôles played by Ca, total electrolytic content, pH and CO₂ in producing the longer survival of grouped planarians.—W. C. Allee.

7184. HALL, R. P., and H. W. SCHOENBORN. Fluctuations in growth-rate of *Euglena anabaena*, *E. gracilis*, and *E. viridis*, and their apparent relation to initial density of population. *Physiol. Zool.* 12(2): 201-208. 6 fig. 1939.—Fluctuations in growth rate of autotrophic strains of *Euglena anabaena* var. *minor*, *E. gracilis* and *E. viridis* were noted in successive transfers in inorganic media. These fluctuations appear to be dependent upon an inverse relationship between growth rate and the initial density of population. Comparable relationships were also observed

in paried series differing only in initial density of population. Under the conditions described, the initial density of population seems to be more important, in its influence on growth rate, than are environmental factors which in themselves are known to influence the rate of population growth.—R. P. Hall.

7185. HUNGATE, R. E. Experiments on the nutrition of *Zootermopsis*. III. The anaerobic carbohydrate dissimilation by the intestinal protozoa. *Ecology* 20(2): 230-245. 4 fig. 1939.—The hypothesis is advanced that the protozoa of *Zootermopsis* carry on an anaerobic fermentation process which gives rise to products absorbed and used by the termite. By mechanical separation of the protozoa and suspension in suitable media it is shown that they are anaerobic and accomplish a fermentation process which cannot be ascribed to bacteria. CO₂, H₂, and H Ac are identified as metabolic products. The amts. of these products recovered indicate that other more reduced materials are also formed. The amt. of cellulose digested in the termite is compared with the amount of fermentation products recovered; most of the cellulose utilized apparently undergoes the fermentation process by the protozoa.—R. E. Hungate.

7186. MATHIAS, P. Sur la résistance de *Palaemon squilla* et de *Crangon vulgare* à la diminution de salure de l'eau. *Bull. Soc. Zool. France* 63(6): 337-343. 1938.—These species can be kept alive, at least for some days, in sea water diluted to at least 255 times its original volume. Specimens bearing a *Bopyrus* parasite died much sooner than specimens not so parasitized.—R. Paulhan.

7187. SWEET, HELEN E. A micropopulation study of *Euglena gracilis* Klebs in sterile, autotrophic media and in bacterial suspensions. *Physiol. Zool.* 12(2): 173-200. 5 fig. 1939.—Optimal, supraoptimal, and suboptimal volume relations of cultures of washed-sterile euglenae exist, which regulate growth or survival of a group accordingly. There are optimal, suboptimal, and supraoptimal densities of bacteria associated with euglenae populations. Deterrence of division is common in the densities and with the species of bacteria tested. Some material or materials present in sterile or nonsterile wheat infusions is more conducive to growth of populations of euglenae, and also affords more protection against toxic effects of ultra-violet irradiation, than does the artificial salt soln. tested. Smaller inocula show significantly greater advantage in situations in which the deleterious elements of the environment are not too great. Larger inocula show significantly greater advantage when the defects of the environment are greatest. Jahn (1929) found, from the study of mass cultures, no evidence of the Robertson effect; his least-dense cultures, however, correspond fairly well to the optimal numbers constituting an inoculum for the present small volume cultures, whose division rates were found to be greater than either those in more dense or more dilute cultures. The Robertson effect, or certain aspects of it, is present in some of the optimal volumes and may be operating in all of the supraoptimal volumes reported in this paper. To this extent the present studies yield evidence of Robertson's effect. There is, however, no clear evidence of the validity of his theory.—Auth. summ.

PLANT

7188. ALTEHAGE, C., and FR. JONAS. Die Vegetation und Entwicklung eines mitteldeutschen Trockenrasenbodens bei Merseberg. *Beih. Bot. Centralbl. Abt. B* 55(3): 347-372. 5 fig. 1936.—This paper deals with the "Black soils" of central Germany. The area studied lies in the Leipzig-Halle region 5 km. N. W. of Merseberg. The geology, climate and vegetation of the area is discussed. 3 periods may be recognized in the pollen profiles: the 1st short period with *Pinus* dominant, decreasing *Corylus* and *Alnus*, and at the same time, low *Picea* and *Ericales*. The 2d period shows *Pinus* still leading but with a sharp increase in *Picea* and with it the disappearance of the thermophile elements of the preceding period. During the 2d period there were apparently 3 cooler phases separated by 2 warmer ones. In each of the 3 cooler phases only *Pinus*, *Picea* and *Betula* occurred. The 2 warm phases are older than preboreal and belong in the early post-glacial. The last period is the post-glacial period of the reappearance of the thermophile spp.

Corylus, *Alnus* and *Quercus*. In the uppermost samples the better known spectra of the Boreal and Early Atlantic occur. The real *Pinus* maximum of the Boreal is absent. The time of formation of the "Black Soils" was in the Bühl stage with the following Late Glacial. The beginning of soil formation at Knapendorf falls about 32,250 B. C. The forest period of the 3 forest phases then comprises an interval of around 20,000 years (50,000 to 30,000 B. C.). A comparison of the Knapendorf profiles with those of the Kowel type shows a close agreement from which conclusions are drawn as to the climatic changes during the geological periods in which these profiles were formed.—H. F. Bergman.

7189. BUKEY, F. S., and J. E. WEAVER. Effects of frequent clipping on the underground food reserves of certain prairie grasses. *Ecology* 20(2): 246-252. 1939.—Plots of little bluestem (*Andropogon scoparius*) and big bluestem (*A. furcatus*) were clipped frequently during 1933-34-35 at Lincoln, Nebraska. Underground parts of control and clipped plants were analyzed chemically several times during 1934-35. There was a marked decrease in the percentage of invert sugar, water-soluble hydrolyzable material and water-insoluble hydrolyzable material under conditions of severe clipping. Drought during 1934 and 1935 had a similar but smaller effect on the stored nutrients of the control plants for comparable periods. N was almost constant, varying between .42% and .78% under all conditions of the expt.—J. E. Weaver.

7191. COOPER, WILLIAM S. A fourth expedition to Glacier Bay, Alaska. *Ecology* 20(2): 130-155. 13 fig. 1939.—This complex fiord, 60 miles long, is bounded by flat forelands and low mountains along its lower portion, followed by an open expanse of 15 mi. surrounded by abrupt mountain slopes. Glaciers descend from the mts. and in 1935 some 9 of these reached tide-water. Some centuries ago the ice fields were more contracted than at present. This contraction was followed by an increase that reached its max. 200 yrs. ago. Since that time there has been a rapid retreat. Vancouver's record has made possible the detn. of the location of the ice front in 1794. Permanent quadrats established in 1916 show 3 successional stages of vegetation: (1) A pioneer community of *Rhacomitrium canescens*, *Epilobium latifolium*, *Equisetum variegatum*, *Dryas drummondii* and prostrate willows; (2) A *Salix-Alnus sinuata* thicket; and (3) A climax forest of *Picea sitchensis*, *Tsuga heterophylla* and *T. mertensiana*. Records of the quadrats indicating this succession are shown in charts and tables. Similar stages exist on the foreland and these are descr. in detail. Evidence is presented that interglacial forests, reaching climax stage, existed during the period of contracted ice fields preceding the late glacial maximum. These forests extended northward in the Muir Inlet at least as far as the ice has now receded. Proof of the existence and extent of these forests is seen in the stumps and other forest relics that are being uncovered. The ancient and modern forests appear to be essentially identical in character.—G. D. Fuller.

7192. EMBERGER, L. Aperçu general sur la végétation du Maroc. *Veröffentl. Geobot. Forschungsinst. Rübel* 14: 40-157. Map, 11 pl., 5 fig. 1939.—The Mediterranean climate is characterized by the coincidence of the cold and wet seasons, the summers being dry. Among Mediterranean climates the Moroccan represents a rather oceanic type, the temp. amplitudes being generally small. The types of climate of Morocco are classified: Saharian, arid, semi-arid, sub-humid, humid and alpine Mediterranean climate.—Saharian: Typical deserts do not exist in Morocco, even the driest places receive small amts. of precipitation each year during the winter. Even outside the river valleys there is a permanent, but very scanty, vegetation, partly dominated by Acacias (*A. raddiana*, *A. seyal* and *A. gummifera*) on sandy soil, partly by smaller bushes or dwarfbushes like *Anabasis aethioides* on rocky soil. Real desert sand dunes do not occur in Morocco, the small ones occurring are colonized by *Aristida pungens*, etc. Characteristic sp. of oases: *Phoenix dactylifera*. Arid region: Climate very dry, represented on the S and E shores of the Mediterranean, it is seldom found in Europe but occupies great areas in Morocco. The warmer types are characterized by open forests, the colder by

types by *Stipa tenacissima* steppes. Vegetation types: 1: *Argania spinosa* forest, in primitive state rather dense and with abundant undergrowth; grows on all types of soil except loose sand. Approaching the dryer regions, the forest becomes lower and *Argania* gives way to *Euphorbia echinus* et al.; along the shores the occurrence of *Pistacia* and *Olea* indicates a semi-arid climate. 2: *Zizyphus lotus* and *Acacia gummifera* form extensive scrubs, generally much degraded by pasturage. Great areas are transformed to secondary *Stipa tortilis* steppes. Soils often show a conc. of soluble salts in upper layers. 3: The *Stipa tenacissima* steppes on well-drained soil and the *Artemisia herba alba* communities on heavier soils represent the colder types of arid vegetation, in regions where winter temps. are lower. They also occur in places where the dryer forest types have been destroyed.—The semi-arid region occupies immense areas in the Mediterranean countries; in Morocco it is found both on the Atlantic and Mediterranean sides, encircling the central mountain massifs. The main difference between this climate and the preceding, greater humidity, is conditioned partly by higher precipitation, partly by lower evaporation. According to the geographical position, the temp. of the coldest month is above or below 0°, thus presenting a series of sub-types. The coldest types are characterized by the occurrence of *Juniperus thurifera*, the intermediate by *J. phoenicea*, the warmest by a number of plant communities that distribute themselves according to the properties of the soil. 1: *Callitris articulata* forest. Generally rather indifferent with regard to nature of soil, but near limits of distribution restricted to calcareous soils, being crowded out from other types by competitors. In primeval state the *Callitris* forest is a rather open forest with high-grown trees with a remarkable number of characteristic spp. 2: *Juniperus phoenicea* forest. Quite indifferent with regard to the nature of the soil; it substitutes *Callitris* whenever the climate becomes more continental. However, it does also occur along the coasts, but only on unstabilised sand that cannot be invaded by other spp. *J. phoenicea* occupies an intermediate altitudinal position between *Quercus ilex* (above) and *Callitris* (below), it does not occur in the most oceanic parts, and does not form a pure belt except in the driest, where *Callitris* does not grow. Most of the *J. phoenicea* forests are destroyed. The littoral *J. phoenicea* forests are floristically quite different from the regular type. 3: *Juniperus thurifera* var. *africana* forests. These replace the *J. phoenicea* forests in the most continental parts of the semi-arid region, where winter temps. are rather low, chiefly confined to the Grand Atlas Massif. But in other massifs this sp. occurs also in moister situations, forming the timber-line. The low temps. are here conditioned by the altitude. *J. thurifera* is often the only remains of *Cedrus* forests, disappeared long ago, the *Juniperus* surviving as the most resistant sp. Many *J. thurifera* forests are really reduced cedar forests. Further forest destruction must be prevented as the *J. thurifera* forests are of very great economical importance. As the forests are very open, their undergrowth is most varied, even including cushion plants from the alpine regions. 4: The *Olea-Pistacia-Chamaerops* scrub occupies considerable areas, but is confined to heavy clayey soils. As soon as the soil changes, *Callitris*, *Quercus suber* or *Q. ilex* invades. As the community occupied those soils that were best suited for cultivation, it has been almost totally destroyed. The extreme state of degradation is the *Chamaerops humilis* community. In spring this scrub is characterized by a multitude of flowering plants, to a great extent geophytes. 5: *Pinus halepensis* forests are rather rare in Morocco, but the recent degradation seems to favor its spreading. The old, relict forests are surrounded by a zone with younger trees. In the dryer parts of Morocco, however, *Callitris* is favored, as conditions are a little too dry for *P. halepensis*. The strictly local old *P. halepensis* forests differ a great deal from each other and constitute 2 different floristic types, one Mediterranean and one Atlantic. 6: *Cupressus sempervirens* forest is represented in one place. Its floristic composition shows that it is a *Juniperus phoenicea* forest which has become dominated by *Cupressus*. 7: The following forest types are represented in the semi-arid region, but have their proper distribution outside it: *Aragania* forest, *Quercus suber* forest and *Q.*

ilex forest. The subhumid region is in Morocco restricted to the middle altitudes in the mountains, except in a few places with very great precipitation. 1: *Quercus ilex* forest. *Q. ilex* is distributed over great areas and has covered still greater. It is preferably a montane sp. The semi-arid types are low, with an under-growth which is very like that on the *Q. suber* forest. The primeval *Q. ilex* forest is composed of trees with straight stems, middle height, very dense and with little undergrowth. Most forests are, however, more open, due to logging operations and the under-growth therefore much richer. 2: *Quercus coccifera* community (scrub or, rarely, low forest) is restricted to a very limited area in Morocco. 3: *Pinus pinaster* forests really belong to the humid region, but are represented also in the sub-humid. 4: The *Olea-Pistacia-Chamaerops* scrub is represented by a type without *P. atlantica* (but containing *P. lentiscus*). 5: *Quercus suber* forests are decidedly calcifuge. They are widely distributed in Morocco and represent very great economic values. During a previous, moister period, the tree had a much greater distribution than today, many isolated outposts must be considered relicts from this period. Some of these belong to the semi-arid region; the famous forest of Mamora also lies within this region, on sandy soil. While the semiarid types are rather open, the subhumid is much denser and the tree crowns form a continuous cover. Both types invade the *Olea-Pistacia-Chamaerops* scrub where the soil is not clayey. The humid region, in which the Mediterranean character of the climate is less pronounced, occupies smaller areas than the preceding. In the lowlands this type of climate is rare, in the mountains a colder subtype is more distributed. 1: *Cedrus atlantica* forest occupies an area of 215,000 ha. at present, but very much has been destroyed. It occurs between 15-1600 and 2900 m.s.m., it never forms the timberline. It is curious that *Cedrus* does not occur, nor does it seem to have occurred in places, e.g., in Grand Atlas, where the climatic conditions seem to favor its occurrence. 2: *Abies pinsapo* ssp. *maroccana* occupies a small area, forming forests between 1500 and 2100 m. 3: *Quercus tozza* also occupies a very small area. 3: *Quercus faginea* forests do not occupy a very great area, but are widely distributed, indicating a former greater importance. It is a very well established community that cannot be invaded by other spp., but *Q. faginea* partly invades the surrounding forests. 5: *Quercus suber*, *Q. ilex* and *Pinus pinaster* also occur in small quantities in the humid region. The altitude of the timber-line varies between 28-2900 and 31-3200 m.s.m. It is generally composed by *Juniperus thurifera*, sometimes by *Q. ilex*. A sub-alpine scrub-belt is never found.—The alpine region is decidedly dry, the maximum of precipitation lying lower than the timber-line. The lower alpine region is characterized by the dominance of cushion-plants. Most remarkable stations are formed by soil that is permanently wet. The flora of such places bears a very strong resemblance to the European alpine flora. Chionophilous vegetation is formed by *Ranunculus geraniifolius* ssp. *aurasiacus*, *Cossonia* spp. etc. The highest zone is characterized by a very scattered herb vegetation. The flora is composed of 26 spp., 20 of which are endemic. The most important edaphic vegetation types are those of salt soil, *Atriplex halimus*, etc., scrub and *Spartina stricta* ssp. *maritima* communities, the latter occurring on the seashore. Intermittent lakes, dry in summer, are characterized by a vegetation of *Juncus* spp. and in the permanently water-covered parts, *Phragmites*, etc. With regard to all communities mentioned the paper gives an account of distribution and floristic composition. The distribution of *Chamaerops humilis* and *Stipa tenacissima* in Morocco is mapped.—K. Faegri.

7193. HANSEN, HENRY P. Pollen analysis of a bog near Spokane, Washington. *Bull. Torrey Bot. Club* 66(4): 215-220. 1 fig. 1939.—Pollen analysis of a post-Wisconsin bog in Northeastern Washington, in a *Pinus ponderosa* climax formation, indicates the following stages of postglacial forest succession: (1) An initial forest of *Pinus contorta*, *P. monticola*, and *Larix occidentalis*, with a preponderance of the first; (2) A period of increase in grasses; (3) A period of heavy influx of Composites and Chenopods; (4) Increase in *Pinus ponderosa*, *P. contorta*, and *P. monticola*, with dominance of the first; and (5) A final period of climax.

forest dominated by *Pinus ponderosa*. In terms of climate this succession marks an initial period of coolness and medium dryness, followed by increasing warmth and aridity, which was succeeded by a period of increasing coolness and moisture reaching a maximum, which has remained more or less constant to the present.—*H. P. Hansen*.

7194. HEATH, O. V. S., and F. G. GREGORY. The constancy of the mean net assimilation rate and its ecological importance. *Ann. Bot.* 2(8): 811-818. 1938.—The data of net assimilation rate during the vegetative phase have been compared for a number of annual plants of different types grown at different latitudes under varying manurial conditions. The mean net assimilation rate is not very variable, and the seasonal variation for barley in 4 years (0.418-0.658 g./dm.²/week; mean 0.546) is nearly as great as that found among the different spp. examined grown in various locations (0.413-0.720; mean 0.552). The total CO₂ assimilated per unit area of leaf surface must therefore be nearly constant for the plants examined. Differences in dry matter production are mainly due to differences among plants in rate of production of leaves and size of leaf surface. The importance of establishing net assimilation rate in ecological investigations is stressed.—*O. V. S. Heath*.

7195. HEYWARD, FRANK. The relation of fire to stand composition of longleaf pine forests. *Ecology* 20(2): 287-304. 7 fig. 1939.—A detailed study was made of stand composition of 51 long-unburned forests of longleaf and slash pines as compared with nearby forests subjected to repeated forest fires. The areas studied were widely distributed over the longleaf pine region from S. Carolina to Louisiana. Hardwoods were numerous in practically all longleaf pine stands of pole size or larger from which fires had been excluded for more than 10 yrs. In dense young pine stands hardwoods were not numerous enough to present a problem. The study revealed a strong trend toward hardwood invasion in such stands, however, the hardwoods becoming increasingly abundant as the pines increased in height, since the increased space beneath the pine canopy gave more room in which the tolerant hardwoods might develop. On areas where no fires had hindered the growth of the hardwoods, they had developed into dominant and co-dominant trees in the pine stand and occupied a considerable percentage of the total crown space within the dominant stand. As a direct result of fire protection, therefore, a pure longleaf pine type may become a mixed pine-hardwood forest. Furthermore, if no silvicultural measures are taken to retard the development of the hardwoods, pines will ultimately be completely excluded from the forest by hardwoods.—*F. Heyward*.

7196. JÄESCHKE, J. Zur Waldgeschichte des Knüllgebirges. *Forstwiss. Centralbl.* 60(21): 676-683. 1 fig. 1938.—Pollen analyses of peat from the Knüll Mt. in western Germany indicate that forest vegetation since the oak-mixed forest period developed there in much the same way as in other nearby districts.—*W. N. Sparhawk*.

7197. JUDD, B. IRA. Plant succession on scoria buttes of western North Dakota. *Ecology* 20(2): 335-336. 1939.—On the scoria buttes there has been initiated a unique type of plant succession. The soil is highly alkaline, and subject to active erosion accompanying the torrential rains. On the steep slopes most of the pioneer species are perennials with tap roots, such as *Artemisia longifolia* and *Eriogonum multiceps*. In addition to the pioneer stage, a 2d weed stage, a 1st grass stage, a climax stage and a post-climax stage are recognized. The last named stage is characterized by the growth of trees along the stream beds. Development of the various seres or stages depends on the development of the soil.—*B. I. Judd*.

7198. KIELHAUSER, GUSTAV E. Zur Oekologie des Quercetum galloprovinciale pubescentetosum. *Oesterreich. Bot. Zeitschr.* 88(1): 24-42. 1939.—The above community, a subassociation of the climax Quercetum ilicis galloprovinciale, and characterized by 17 differential spp. of which 13 belong to the "Quercion pubescentis petraeae (= sessiliflorae)" limited in the Mediterranean countries to the mountains, thus being a subassociation with a "Mediterraneo-montane character," was examined on diluvial terraces of glacial "Flussgeschiebe," sands and clays, in

Bas Languedoc (southern France). The subassociation prefers a northerly exposure. Its soil is similar to "red ground," being deprived of limestone and the pH varying from acid to neutral in the various strata. The content of SiO₂ is greater (83-94%) than in red ground above limestone (54-61%). The content of Al₂O₃ + Fe₂O₃ is less than in red ground, and far less constant in the various strata. The physical characters of the soil are a high specific gravity and a low degree of aeration; in the lower strata lower temp. and a strong water-holding capacity. Being related to podzol, it should be termed (according to Braun-Blanquet) a "slightly podzolized red-ground soil" (schwach podsolierter Roterdeboden). It is supposed that the physical characters of the soil, especially the water holding capacity, enable that community to subsist in a climate less favorable to it, thus it would be an edaphic paraclimax which, under the given conditions, can exist beside the climax.—*M. Onno*.

7199. KITTREDGE, JOSEPH JR. The forest floor of the chaparral in San Gabriel Mountains, Calif. *Jour. Agric. Res.* 58(7): 521-535. 1939.—Coverage and certain physical properties of the forest floor are analyzed for 25 communities and various groupings of the spp. in 2 areas, one, in a 15-year burn at 3000 and the other, more than 50 years unburned, at 5000 feet elevation. Wide variation within communities is characteristic so that differences between their means are often not significant. Mean dry weights per acre ranged from about 3 to 21 metric tons, volume weights from 0.08 to 0.36, field moisture capacities from 125 to 191% and depths of water retained from 0.04 to 0.29 inch. The latter figures give an indication of the amount of water that might be held subject to evaporation after each rain.—*J. Kittredge, Jr.*

7200. KITTREDGE, JOSEPH JR. The annual accumulation and creep of litter and other surface materials in the chaparral of the San Gabriel Mountains, Calif. *Jour. Agric. Res.* 58(7): 537-541. 1939.—Collections were made in 1935, 1936, and 1937 from 118 wire-bottomed trays, 3 feet square, placed to sample 19 communities in 2 canyons, one at 3000 and the other at 5000 feet elevation. The average annual accumulation for different communities varied from 0.2 to 1.4 metric tons per acre and in different years, from 50 to 150% of the 3-year average. The ratio of total forest floor to the annual accumulation ranged from about 8 in 18 year old stands to 26 in stands over 50 years old. Leaf material constituted from 36 to 67% of the annual accumulation. Sufficient creep took place annually to override the 2-inch barrier formed by the upper sides of the trays and to indicate such movement was occurring on about 17% of the area.—*J. Kittredge, Jr.*

7201. KLIKA, JAROMIR. Das Klimax-Gebiet der Buchenwälder in den Westkarpathen. *Beih. Bot. Centralbl. Abt. B* 55(3): 373-418. 2 maps, 2 fig. 1936.—The Carpathians are a natural climax region of beech forests. The "Grosse Fatra" a range of the Fatra group was chosen for study. Their geographic limits, geological structure, and climatic relations—temperature, precipitation and solar radiation—are discussed. The altitudinal distribution of the forests is also given. The forests consist of the following associations: I. The beech alliance with one association Fagetum carpaticum Fatrae occurs on the most favorable soils and there forms the climax. To it belong the subassociation with *Allium ursinum* and the subassociation with *Carex alba* which occupies large areas and is a developmental stage. The effect of agricultural encroachment on this association and its degradation and progressive stages after clearing are indicated. Other subassociations in less favorable locations are: *Elymus europaeus* with frequent *Acer pseudoplatanus*, *Aceretum pseudoplatani* Fatrae, *Fagetum montanum carpaticum* Cortusae, and *Fagetum nudum*. II. The Piceion excelsae alliance as original stands is limited to siliceous subsoils and higher situations. Forestry has also led to its development in lower places. Its subassociations are: the Piceetum excelsae filicetosum and its facies with *Athyrium alpestre* and with *A. filix femina*, and Piceetum excelsae myrtilletosum and the facies with *Vaccinium myrtillus* and with *Calamagrostis villosa*. III. The pine association (*P. mughi*) occurs rarely in the Grosse Fatra. The floristic composition, ecological (edaphic and biochemical) condi-

tions, rejuvenation and development are given for each association.—*Auth. summ. (tr. by H. F. Bergman.)*

7202. KLIKA, JAROMIR. Xerotherme Pflanzengesellschaften der Kováčover Hügel in der Südslovakie. *Beih. Bot. Centralbl. Abt. B* 58(3): 435-465. Map, 1 pl., 1 fig. 1938.—The Kováčover Hills, the westernmost extension of the Hungarian Mitteldonau Hill lands, are characterized not only by floristic richness but also sociologically by their plant associations. Microclimatic and edaphic influences come into operation. Climatic data are given. In the order Brometalia, alliance Festucion vallesiaceae, 7 initial stages are recognized for the 2 typical communities: the *Festuca pseudodalmatica-Minuartia glomerata* community and the *Festuca vallesiaca-Ranunculus illyricus* community which appear fragmentarily on deep loess and sand soils with large amounts of Ca. The order Quercetalia, alliance Quercion pubescentis has only the *Quercus pubescens-Fraxinus ornus* community in extremely warm and dry situations on nearly neutral soils. It is floristically rich; in its succession it is connected with the previously named communities. The order Fagetalia, alliance Eufagion has only the Querceto-Carpinetum in which the subassociation the Querceto-Carpinetum caricetosum pilosae occurs in the Kováčover Hills in several xerophile and moister local variations (west or northwest exposure or in moist ravines).—*Auth. summ. (tr. by H. F. Bergman.)*

7203. LINDQUIST, B. Dalby Söderskog. [The Southern forest of Dalby.] [With Ger. summ.] *Acta Phytogeograph. Suecica* 10. 1-273. 99 illus. 1938.—The broad-leaf forest in question is now a natural reservation (Prov. Scania, Sweden). It comprises some traces of very ancient habitation. Later, in medieval times, it was utilized as pasturage for horses belonging to the Dalby monastery. On the discontinuance of this practise the open glades were rapidly transformed to dense hazel copses. On the establishment of a government stud, the forest was once more opened up for grazing purposes. After the wars in the beginning of the 18th century there was less grazing and a new generation of trees came up. The next generation of trees dates from the beginning of the 19th century when extensive lumbering operations were carried out and conditions for regeneration became favorable. The forest was then left undisturbed until 1900, after which year great quantities of wood were cut, chiefly for fuel, until 1917, when the forest was declared a reservation.—The soil is clayey, rich in lime, but resting on poorer drifts. A critical evaluation shows that the forest at present consists chiefly of *Quercus* and *Ulmus* with smaller amounts of *Fagus* and *Fraxinus*. The oak seems to be over-represented; left to itself, the forest would certainly change in composition, oak and beech disappearing while elm and ash gained ground. The present composition is the combined result of grazing and forest-management operations. The oak can regenerate freely on rather acid, dry soil only, such as was present earlier when trees were cut and under-growth grazed. The other spp. regenerate better on eutrophic, subneutral substratum in shade. Oak cannot maintain itself on eutrophic soil at present.—Even beech is losing ground in the forest as its regeneration is successful on light clays only, which are not too moist. Elm regenerates continually in the forest (while the two others only propagate themselves when the ground is cleared) and is gaining ground. Ash has a fair chance on moist soil; at present it is over-represented.—In the brushwood the hazel is able to maintain its position and even to form such dense copses as to preclude the regeneration of the trees incl. elm.—The "föna" (vegetable debris) consists chiefly of leaves from the trees, covering the ground with 5-10 cm loose material in the autumn, or 0.3 kg/m² on the average. Elm föna decomposes very rapidly, having disappeared almost totally in May, while the oak and beech föna decompose slowly; immediately before the next fall of leaves still 32 and 15% were left from last year. Ash and hazel föna occupy intermediate positions, 45, resp. 31% present in May, nothing in August. The oak, elm and hazel föna are subneutral and contain great amounts of P₂O₅; the oak and beech föna are acid and contain less P₂O₅.—The number and weight of earthworms in 17 sq. m plots are given, *Alolobophora caliginosa*, *Eisenia rosea* and *Lumbricus rubellus* being dominant (40, 31 and 15%). Microbiological de-

composition is especially important with regard to beech and oak föna, the others being devoured by the earthworms before the microbiological processes have made serious attacks. Also the spring flora (*Anemone nemorosa*, *Allium ursinum*, etc.) föna is mainly decomposed microbiologically. Through attacks of insects, snails, slugs, etc. considerable amounts of fresh vegetable matter are transferred directly to humus without passing the föna stage.—The earth-mould is divided in granular mould 4-22 cm thick on top, immediately below föna, and amorphous mould 5-50 cm underneath. The upper consists chiefly of humus, the lower of humus + mineral matter. pH of mould layers 6.8 (—6.5), of minerogenous subsoil 6.7-7.3. Ca, 200-300 mg/kg, and P₂O₅, 150-400 mg/kg are rather evenly distributed in the soil profile, the latter with a slight concentration toward lowest layers, while K and NO₃ are concentrated in the upper layers, 16-21, resp. 120-140 mg/kg against 2-4, resp. 10-57 in the lower mould layer and unchanged subsoil.—Spp. belonging to cultivated fields and which came in during logging operations 1914-16, have disappeared to a great extent already and are going to disappear totally in the future. Spp. of meadows are able to maintain their position in places where tree growth is hampered. A number of typical forest herbs, which are common in surrounding woods, are not represented in D.S., probably owing to the previous pasturage. Total number of phanerogams in 1925, when this investigation was inaugurated: 255, in 1935: 204, decline ca 20% except for phanerophytes, 7%, and therophytes (cultivated fields), 60%.—Vegetation units are synusia, societies, which are combined to the following unions: 1: *Anemone nemorosa-Oxalis* union on mesic soil in oak and beech forest. 2: *Anemone nemorosa-Ranunculus ficaria* union on moist soil in ash, elm and oak forest. 3: *Ranunculus ficaria* union on wet soil. Several societies are described in spring and summer aspects. Analyses of 17 permanent quadrats demonstrate the decrease of the covering of usual grasses and herbs with increase of covering in upper strata. Covering of spring herbs has, however, increased.—*K. Faegri.*

7204. LÜDI, W. Beitrag zu den Beziehungen zwischen Klimavegetation und Boden in Marokko. *Veröffentl. Geobot. Forschungsinst. Rübel* 14: 222-258. 3 pl. 1939.—Soil profiles were studied in places where the climax vegetation was supposed to be comparatively undisturbed. Several types were studied, ranging from semihumid to arid. Semihumid: *Cedrus atlantica* forest, *Cedrus-Juniperus thurifera* forest, *Quercus ilex* forest and *Q. suber* forest (the latter in a semiarid climate). The upper horizon (A₁) of these forests contains considerable humus (partly colloidal) and has generally lost most of its original lime content; the latter applies also to the A₂ horizon, which looks like the ordinary brown soils of Europe. The soils are neutral or slightly alkaline locally, especially in places where vegetation is degraded, slightly acid (lowest pH value 6.16). No indications of a podzolization were observed. In the drier parts of this same region the humus contents are smaller and the lime has not been washed away from the upper layers, reaction is decidedly alkaline, even where the bed-rock does not contain lime. On limestone may sometimes be found small lime concretions in the upper soil layers.—Semiarid: *Quercus ilex* forest, *Juniperus thurifera* forest, *Callitris articulata* forest. Soils have a smaller, but distinct concentration of organic matter in the brown A₁ layer. Lime concentrates to concretions in a subsuperficial layer. Reaction is distinctly alkaline.—Arid: *Callitris forest*, *Argania spinosa* forest, *Zizyphus lotus-Acacia gummiifera* brush-wood. The limestone concretions form a continuous layer 30-50 cm. below the surface, even on granitic bed-rock, in the latter cases due to CaCO₃ content of circulating groundwater or wind-borne dust. The undisturbed surface shows a dark A₁ layer with some humus. In extreme cases even chlorides and sulfates are found in the upper layers.—In undisturbed state all these soils bear forests or brush-wood. Arid soils and unripe minerogenous soils in more humid regions have in common a higher conc. of electrolytes in the ground water; the plant-communities of unripe soils are often more xeric than the climax communities, and the climax of arid regions occur locally in places with abnormally high electrolyte conc. in less arid regions. The soils of Morocco

are old, dating back to the tertiary; some of the features described may have developed under climatic conditions different from the present. The effects of pasturing, foresting, cultivation, etc. have largely been a degradation of the soil.—*K. Faegri*.

7205. McCULLOCH, WALTER F. A postglacial forest in central New York. *Ecology* 20(2): 264-271. Map. 1939.—Study of pollen deposits in a bog near Syracuse, New York, indicated the presence of a postglacial coniferous forest which was gradually replaced by hardwoods. This finding confirms, for the Eastern Great Lakes, a forest sequence established by other investigators in Ohio, Michigan, Illinois, Wisconsin, and Minnesota. The customary method of separating peat from pollen by chemical means was supplanted by a mechanical dispersion of the materials.—*W. F. McCulloch*.

7206. MAIRE, R., et L. EMBERGER. Notes sur le programme de l'itinéraire botanique exécutée par les membres de la 8ème I.P.E. *Veröffentl. Geobot. Forschungsinst. Rübel* 14: 5-34. 1939.—Diary with remarks on stations, vegetation and collections.—*K. Faegri*.

7207. MATTICK, FRITZ. Aufruf zur Mitarbeit an der pflanzengeographischen Kartierung Deutschlands. *Oesterreich. Bot. Zeitschr.* 88(1): 62-63. 1939.—The mapping of plant areas was begun in Germany in 1922. It will be extended to Austria, and collaborators are invited to communicate with "Zoologisch-Botanische Gesellschaft" at Vienna, which is the local organization.—*M. Onno*.

7208. MOLINIER, R., et P. MÜLLER. La dissémination des espèces végétales. *Rev. Gén. Bot.* 50(590): 53-72; (591): 152-169; (592): 202-221; (593): 277-293; (594): 344-358; (595): 397-414; (596): 472-488; (597): 532-546; (598): 598-614; (599): 649-670. 45 fig. 1938.—To the static view of vegetation, the authors add the dynamic view which depends on the vagility of plants. A diaspore is defined as any of the complexes (embryo, seed, flower, inflorescence, etc.) separable from the mother plant and assuring dissemination. 6 types of diaspores are recognized, ranging from embryos alone to whole plants. The adaptations of diaspores favoring dissemination are grouped under 4 types: 1) morphological and anatomical characteristics facilitating elevation and transport of diaspores; 2) color and perfume, attracting animals; 3) favorable position on the plant; 4) concordance between adaptations, the period favorable for dissemination and that of the maturity of the seeds. Plants are classified according to their mode of dissemination. In each class the efficiency of the dissemination depends not only on the activity of the agent of dissemination but also on the adaptive value of the characteristics realized by the species. 6 main classes, with several subdivisions, are recognized and named after the agents of dissemination, as follows: I. Anemochores, II. Hydrochores, III. Zoochores, IV. Anthropochores, V. Autochores, VI. Barochores. The subdivisions of each class are descr., their efficiency discussed and examples given. The major portion of the paper is given over to a characterization of the plant communities from the point-of-view of the percentage composition of the floristic assemblage in terms of types of diaspores. Over 500 spp. enter into the composition of the associations of the alliances of the French Mediterranean region considered by the authors. In general, each family has a principal method of dissemination, with other methods more or less secondary. Anemochores are most numerous, 59.2% of the spp. having this type of adaptation for dissemination; zoochores are next with 36.8%, followed by anthropochores, barochores, autochores, and hydrochores. Polychores make up 15.8% of the species.—*S. A. Cain*.

7209. OSBORN, F. G. B. Some comparisons between the vegetation of Morocco and Australia. *Veröffentl. Geobot. Forschungsinst. Rübel* 14: 168-191. 2 pl., 4 fig. 1939.—Morocco and the central part of S. Australia occupy similar geographical positions and their climates are similar as demonstrated by graphs. Precipitation curves are more extreme in Morocco, the rainfall being concentrated in the winter to a higher extent than in Australia; hence crops can be grown in places with a lower total precipitation in Morocco than in Australia. Effects of the activities of man are less prominent in Australia. Some vegetation types met with in Morocco and there generally supposed to be due to

anthropogenous influence (degraded forests) are also found in a primeval state in Australia. It seems to indicate that they might be so even in Morocco; this applies especially to treeless plains on alluvial soil. Soil types are also similar in the 2 districts, e.g., the croute desertique soil recalls the important mallee soils of Australia. Comparisons between a number of communities from both regions demonstrate that in spite of great differences in floristic composition (e.g., *Quercus suber* versus *Eucalyptus* spp.), the general impression of vegetation is the same in districts of a similar climate. The principal difference is found in the more arid parts, the extensive *Stipa tenacissima* steppes of Morocco having no equivalent in Australia.—*K. Faegri*.

7210. PIJL, L. van der. The re-establishment of vegetation on Mt. Goentoer (Java). *Ann. Jard. Bot. Buitenzorg* 48(3/4): 129-152. 2 pl. 1938.—The ash and the lava on the slopes of Mt. Goentoer show remarkably slow revegetation. Since the eruptions of 1847 only in the nebulous zone about 1400 m. has a low and thin forest developed on the virgin soil. It has a peculiar composition and lacks the usual pioneer trees with the exception of some *Ficus* spp. The summit (1700-1950 m) bears a heath vegetation without *Vaccinium* and the lower part (750-1000 m) is still a grass steppe of *Arundinella setosa*, wherein *Heptapleurum* (*Schefflera*) *rigidum* is the pioneer of the forest. The basaltic material seems to weather so slowly that it is even too poor for *Saccharum spontaneum* and *Imperata koenigii*. The new vegetation is in many other respects different from that on Krakatau, which island is not so much a model of revegetation as of recolonisation. The first stages on Mt. Goentoer were not algae and ferns but mosses and epiphytic plants such as orchids.—*L. van der Pijl*.

7211. PURER, EDITH A. Ecological study of vernal pools, San Diego County. *Ecology* 20(2): 217-229. 1 fig. 1939.—The flora of vernal pools in various portions of county is strikingly different from that of the surrounding areas. Almost all plants are fragile annuals, flowering in rapid succession from March to May as the pool areas change from hydric to extreme xeric conditions. List quadrats show a density of from several thousand plants to 50 per square meter.—*E. A. Purer*.

7212. ROLL, HARTWIG. Neue Pflanzengesellschaften aus ostholsteinischen Fließgewässern. Ein Beitrag zur Kenntnis der Wasserassoziationen. *Beih. Bot. Centralbl. Abt. B* 58 (3): 466-475. 1938.—Plant associations in streams of slowly flowing water, in which the flow varies from 20-130 cm./sec., are described. The streams are mostly rich in nutrients and have a high lime content with a reaction of pH 7.5-8.6. All the communities described belong in the order Potametalia in which the characteristic spp. are: *Lemna trisulca*, *Potamogeton lucens*, *P. perfoliatus*, *Ranunculus divaricatus*. In the Potamion eurosibiricum alliance one community, *Beruletum angustifoliae submersae*, is described. Three communities, *Sparganietum ramosi*, *Phalaridetum arundinaceae holstaticum*, and *Glycerietum aquaticae holstaticum*, are included under the Phragmition alliance. The characteristic spp. and other spp. occurring with them in each association are listed.—*H. F. Bergman*.

7213. ROMELL, LARS-GUNNAR. The ecological problem of mycotrophy. *Ecology* 20(2): 163-167. 1 fig. 1939.—In a trenching expt. in spruce forest, *Lactarius glycosmus* and several other fungi occurred in rows just outside of the trenches but were absent on all the 31 trenched areas. From this and other evidence, it is concluded that the obligate mycorrhizal fungi of conifers are nutritively parasites on their host trees, yet are useful to these in building up an efficient absorbing system with moderate expenditure of assimilates. This reciprocal relation is contrasted with the apparently parasitic relation of orchids to saprophytic soil fungi. The monotropas, it is suggested, may form a 3d type by being nutritively epiparasitic on trees associated to the same mycorrhizal fungus.—*L. G. Romell*.

7214. RÜBEL, E., und W. LÜDI. Ergebnisse des Internationalen Pflanzengeographischen Exkursion durch Marokko und Westalgerien 1936. *Veröffentl. Geobot. Forschungsinst. Rübel* 14: 1-258. 1939.—A collection of reports, abstracted separately.

7215. RÜBEL, E. Bericht der Permanenten Kommission der I. P. E. *Veröffentl. Geobot. Forschungsinst. Rübel* 14:

35-39, 1939.—Drs. Rytz and Lüdi have been elected new members of the commission. Schröter and Rübél have resigned. Schröter and the only remaining member of the old commission, Brockmann-Jerosch, died in February, 1939.—K. Faegri.

7216. SIPLÉ, PAUL A. The Second Byrd Antarctic Expedition.—Botany. I. Ecology and geographical distribution. *Ann. Missouri Bot. Gard.* 25(2): 467-514. 6 pl. 1938.—Brief geographical description of regions explored in Marie Byrd Land, King Edward VII Land, and the Queen Maud Mts. where plants were collected on nunataks. Records are given of geological, glacial, light, temp., wind, precipitation, evaporation, and available moisture factors of the environment. Floral lists are given for each locality where collections were made. Lichens and a fungus (*Hormiscium*) were found in the Queen Maud Mts., the farthest south that living plants are known. 89 spp. of lichens and 5 mosses were determined from the collections. All spp. are endemic to Antarctica, but there are very few endemic genera. The collections of the expedition include mosses, lichens, fungi, algae, and bacteria.—F. R. Fosberg.

7217. STAMM v. SCHLEITHEIM, E. Die Eichen-Hainbuchenwälder der Nordschweiz. *Beitr. Geobot. Landesauf. Schweiz.* 22. 1-164. 1 illus. 15 pl. 1938.—The Querceto-Carpinetum has been considered the climax community of N. Middle Europe. 4 subass. are described (Alnetosum, Fagetosum, Calcareum, Acidiphilum). Character spp. are *Carpinus betulus*, *Potentilla sterilis*, *Pulmonaria officinalis*, *Carex pilosa*, *C. brizoides*, *C. umbrosa*, *Scilla bifolia*, *Ranunculus auricomus* (some varieties), *Dactylus aschersoniana*, *Helleborus purpurata*, *Lathraea squamaria*. With the exception of *Carpinus*, all have a wide distribution outside the area of the Q.-C., where they belong to quite different assoc. *Carpinus* prefers deep, stable, eutrophic soils, but cannot compete with beech on the best types, typical *Carpinus* forests are therefore found on soil with little or no lime and in places where spring-frosts prevent the growth of *Fagus*. It does not reach the upper limit of *Fagus*, but goes further down in the SW European lowlands. Many of the character spp. mentioned are often considered typical beech-forest plants, but a survey shows that they occur more frequently in Q.-C. communities. The distribution and ecological demands of the plants mentioned are given. Many so-called constants (occurring in more than 60% of the analyses) such as *Hedera helix*, *Viola silvestris*, *V. riviniana*, *Polygonatum multiflorum*, *Crataegus monogyna*, *C. oxyacantha*, all occur in more than 85%.—The Q.-C. occupies an intermediate position between the typical *Quercus-Tilia-Acer* mixed forests and the more montane *Fagus-Abies* forests, but must be considered part of the former. The subass. constitute continuous transitions toward other ass., the Q.-C. alnetosum toward Alnetum (*Fagus-Abies* forests), Q.-C. fagetosum toward Fagetum (do.), Q.-C. calcareum toward Querceto-Lithospermetum and Q.-C. acidiphilum toward Quercetum medioeuropaeum, the regular, monotonous oak forests of Middle Europe with no hornbeam.—In higher parts of its area the Q.-C. (fagetosum) constitutes a preclimax or regeneration community, conditioned by constant forest-management. The tree layer establishes itself very rapidly, while the undergrowth comes much later. In the Querceto-Lithospermetum area, the Q.-C. (calcareum) occupies the lower parts of the hillsides, on level ground and deeper soil.—*Carpinus* pollen appears very early in Swiss bogs and the species occupied its present area—or more—in early neolithic time but has hardly ever been quantitatively important.—The two main constituents of the Q.-C., oak and hornbeam, have similar ecological demands and are able to regenerate rapidly after being cut or destroyed by grazing animals. This is important as the Swiss Q.-C. forests have been subject to very severe anthropogenous influences. Q.-C. is probably the climax community of dryer regions in N. Switzerland, while *Abies alba* dominates the climax of moister climates.—K. Faegri.

7218. STOMPS, TH. J. Die Höhenstufen im Atlas. *Veröffentl. Geobot. Forschungsinst. Rübél* 14: 158-167. 1939.—In the Grand Atlas, *Argania spinosa* and *Callitris articulata* constitute the lowest zone, *Argania* belonging to its lower part only. The next higher zone is occupied by Quercetum ilicis, 2000-2500 m. above sea level. The higher

zones are too dry to support sub-alpine or alpine vegetation types like those of M. Europe, *Juniperus thurifera* being the only representative of the sub-alpine conifers. The lower limit of the Quercetum ilicis on the N. side is at 1800 m.; farther down a zone of *Cupressus sempervirens* and *Juniperus phoenicea* occurs above the *Callitris* belt. *Argania* is not present. Middle Atlas, the lower limit of Quercetum ilicis is at 1200 m. (climate more oceanic), the upper at 1800 m. Above comes a zone of *Cedrus atlantica*, representing the sub-alpine conifer belt, upper limit 2200 m. Above this are *Juniperus thurifera* and cushion plants. The dwarf-bush zone of the European lower alpine region is not represented because of the dryness of climate. Comparison with Java shows that the upper forest zone of Java belongs to the sub-alpine and even alpine regions and constitutes a parallel to, e.g., the *Alnus viridis* copses of the Alps. The timber-line in Java (Gedeh-Pangerang mountains) is therefore at 2500 m., not at 4000.—K. Faegri.

7219. VILLAR, EM. HUGUET del. L'aire du *Callitris articulata* en Espagne. *Bull. Soc. Bot. France* 85(1/2): 4-14. 1938.—A study of the present and past distribution of *C. a.*, a relict species in Spain, leads to the conclusion that the steppe theory of Spanish vegetation, proposed by Willkomm and Reyes, must be rejected. The extreme south-east, the driest portion of the peninsula, possesses forests instead of grasslands.—E. L. Core.

OCEANOGRAPHY

7220. NIELSEN, E. STEEMANN. Über die Anwendung von Netzfängen bei quantitativen Phytoplanktonuntersuchungen. *Cons. Perm. Internat. Explor. Mer. Jour. Conseil* 13(2): 197-205. 1938.—Nets yield samples which are neither definite nor relative values of phytoplankton quantities. Studying 2 stations, both rich in phytoplankton, the net samples of one may be rich in phytoplankton, the other one contains but small quantities. The estimate of quantity is not improved through knowledge of the volumes of water filtered by the net. The number of species always quantitatively retained by nets is small, but the relationship of such species to total quantity of phytoplankton being variable, it is considered inadvisable to employ nets in investigating conditions of production of phytoplankton in the sea.—E. S. Nielsen.

7221. USSING, HANS H. The biology of some important plankton animals in the fjords of East Greenland. *Meddelelser om Grønland* 100(7): 1-108. 27 fig. 1938.—Vertical plankton hauls were taken at Ella Island and Eskimonaes, East Greenland, in 1931-33. The main reasons for the numerical variation of the different animal spp. during the year are (1) an increase due to reproduction which as a rule is limited to the summer half of the year, and (2) vertical migration. These migrations are induced by the yearly variations in light intensity. Among the Copepoda, *Calanus finmarchicus*, *C. hyperboreus* and *Pseudocalanus minutus*, become inactive and sink to greater depths when in darkness for a long time; the activity of animals of the Metridic type is independent of the light, consequently they are relatively abundant in the upper water in winter. Both types may show positive as well as negative phototaxis and have a light preference characteristic for the stage and season of the year. Positive phototaxis causes the animals of the *Calanus* type to ascend to the upper water during spring and early summer. Most spp. have only 1 generation per year. Spawning of most of the spp. takes place in early summer when the production of phytoplankton is greatest. The Copepoda do not feed from Oct. to May, inclusive, but the intestinal tract is filled in summer. Increase in length is correlated with food supply, but only slightly with temp. The size correlation of a copepodid stage after moulting is detd. by (1) the size prior to moulting and (2) the state of nutrition before moulting.—H. H. Ussing.

LIMNOLOGY

(See also in this issue Entries 7180, 7211, 7236, 8357)

7222. GARDINER, A. C. Fresh-water biology and its applications. IV. Some aspects of waterworks biology. *Ann. Appl. Biology* 26(1): 175-177. 1939.

7223. HUTCHINSON, G. EVELYN. Ecological observations on the fishes of Kashmir and Indian Tibet. *Ecol*

Monogr. 9(2): 145-182. 8 fig. 1939.—The commoner Schizothoracinae (Cyprinidae) of the Kashmir valley may be classed as limnophil, feeding selectively on water plants and invertebrates (*Schizothorax planifrons*, *S. micropogon*), rheophil and carnivorous (*S. esocinus*), and rheobiont, feeding on the bottom material (*Oreinus sinuatus*). The streams of Indian Tibet have higher maximum water temps. and lower O₂ concs. than streams at lower altitudes. The fishes of the region may be regarded as heteroeurythermal, *Nemachilus gracilis* perhaps more than others. The O₂ conc. never falls low enough to act as a limiting factor. The size of the stream, the rate of its flow, and its capacity to produce food are probably the most important factors in regulating the distribution of the fish fauna. The dependence of the fauna on the nature of the stream, independent of chemical factors and temp., permits a schematic presentation of succession in an ideal river system as follows. (I) Headwater streams: *Nemachilus* zone—rheophil spp. of *Nemachilus*, particularly *N. gracilis* and *N. stoliczkae*, *Glyptosternum reticulatum* more rarely. (II) Large streams: *Schizopygopsis stoliczkae*-*Dyptichus maculatus* zone—(a) In least rapid reaches, only *S. stoliczkae* and *Nemachilus* spp.; (b) in intermediate reaches, *D. maculatus*, *S. stoliczkae* and *Nemachilus* spp.; (c) in the most torrential reaches, *D. maculatus* only. (III) Rapid turbid rivers: *Ptychobarbus conirostris* zone—*Ptychobarbus conirostris*, *Oreinus sinuatus*, as well as *Schizopygopsis stoliczkae* and *Nemachilus gracilis*. *Dyptichus* is absent. Rheophil spp. of *Schizothorax* (*S. esocinus*, *S. labiatus*) may be present. (IV) Slow rivers, lacustrine swamps and their channels, lakes.—Probably a composite zone, characterized by limnophil species of *Schizothorax* and fish from other zoogeographic regions entering the periphery of Central Asia, as in the Kashmir valley, where the zone is best developed. Only the streams of II c can be regarded as characteristic of high mountains. Evidence is presented, from Chopra's collections made in Chitral, that where the characteristic species of Zone II are absent, young specimens of *Schizothorax labiatus* and *Oreinus sinuatus griffithii*, penetrate further upstream, into Zone II or even into Zone I, than do the corresponding forms where the complete series of associations is developed. Spp. of *Nemachilus* with functional swim-bladders, in the Pang-gong and Pangur valleys, originated or at least were dispersed, at the time of the high-level Lake Schlagintweit (Third Himalayan Glacial). All the spp. of this group may have had a like origin and dispersal. The available evidence as to post-glacial climatic oscillations is summarized; it is suggested that these loaches have survived in their present habitats, though absent from other lakes which had high-level stages, because post-glacial dry periods would render any lake unsuitable for such fishes unless it were directly connected with at least one other lake and were of sufficient depth.—G. E. Hutchinson.

7224. JAMES, HARRY RAYMOND, and EDWARD A. BIRGE. A laboratory study of the absorption of light by lake waters. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 1-154. 54 fig. 1938.—One of the factors determining the biological productivity of lakes is the amt. of solar radiation that penetrates to different depths. The absorption of radiation at 22 wave-lengths between 3650 and 8000 Å was detd. for distilled water and for 50 lake waters. Settled and filtered samples of lake water were used. The various substances contained in lake waters and which affect the transmission of light are discussed as well as the effect of pure water. This is followed by an elementary analysis of the action of lake waters on light which depends upon 3 factors, viz. (1) water as water, which is highly selective in action, with a maximum at 7400-8000 Å and a minimum of 1-2% at 4000-5500 Å; (2) colored substances in the water which are highly selective with a maximum in the short wave spectrum and a minimum in the long wave spectrum; and (3) suspensoids which consist of plankton organisms and other particulate matter, comparatively non-selective in action.—C. Juday.

7225. JUDAY, C., E. A. BIRGE, and V. W. MELOCHE. Mineral content of the lake waters of northeastern Wisconsin. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 223-276. 1938.—The ranges of the various solutes in the waters of 519 lakes were as follows:—SiO₂, 0-25 mg/l, with less than 1 mg/l in more than 50% of the waters; Fe, trace

to 2 mg/l in the surface water of 74 lakes; Mn, 0.003-0.023 mg/l; Ca, 0.13-18.8 mg/l, with less than 5 mg/l in 52% of 358 lakes; Mg, 0.1-6.5 mg/l in 290 lakes; F, 0.1-0.5 mg/l in 24 lake and spring waters; chloride, 0.1-4.5 mg/l in 474 lakes; SO₄, 0.7-7.8 mg/l; nitrate N, 0.004-0.07 mg/l in 472 lakes. The very soft water lakes showed a markedly smaller biological productivity than those with medium hard waters.—C. Juday.

7226. KOZMINSKI, ZYGMUNT. Amount and distribution of the chlorophyll in some lakes of northeastern Wisconsin. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 411-438. 1938.—In 17 lakes the smallest quantity of chlorophyll was 1 mg/m³ and the largest 386 mg/m³. A wide variation was found in the vertical distribution in the various lakes; 5 types of stratification were noted and their possible causes are discussed. Changes in the chlorophyll content of the water of Trout Lake were observed during the summer. Distinct conc. differences were found in the water layers immediately above the bottom in Trout Lake. The average chlorophyll conc. was calculated for the various lakes and the limnological applications of these values are considered.—C. Juday.

7227. KRASSKE, GEORG. Beiträge zur Kenntnis der Diatomeen-Vegetation von Island und Spitzbergen. Teil I, II. *Arch. Hydrobiol.* 33(3): 503-533. 1 pl., 2 fig. 1938.—In Schwabe's collections from the hot springs of Iceland 290 spp. are recorded; of these 122 were observed by previous investigators. *Cyclotella antiqua*, *Tetracyclus emarginatus* and *Fragilaria constricta* are spp. in a good position to colonize hot springs from nearly cold localities but are unable to do so, other spp. listed may be in the same category. Of the spp. regarded by Schwabe as confined in Iceland to hot springs, 4 are halobiant and limited in their distribution by the chemistry of the water; *Navicula varicosiata*, *Diploneis oculata*, *Eunotia tenella* and *Nitzschia debilis* are in Iceland probably limited thermally to the hot springs. *Navicula ruttneri* known otherwise from the Sunda Is. and there often in hot springs, is a more certain example of a form requiring high temps. A number of spp., known in cold Icelandic waters, reach their maximum development in hot-springs. Lists of aerophil and holophil forms are given. The latter consist in part of marine spp. occurring rarely and probably accidental, and in part of euryhaline spp. which may be established in the springs. 207 spp. are recorded from Spitzbergen. Lists of brackish water, nordic, nordic-alpine and moorland forms are given. New spp., vars. and forms, from Iceland and Spitzbergen, are descr. in *Fragilaria*, (2), *Cocconeis*, *Achnanthes*, *Navicula protracta* (17), *Eunotia*, *Pinnularia*, *Amphora* (2), and *Cymbella*.—G. E. Hutchinson.

7229. LOHAMMAR, GUNNAR. Wasserchemie und höhere Vegetation schwedischer Seen. *Symbolae Botanicae Upsalienses* 3(1): 1-252. 80 pl., 75 fig. 1938.—A study of the correlation between the physical and chemical characteristics of 151 lake waters (84 in central and 67 in northern Sweden) and the occurrence and distribution of the large aquatic plants growing in them. The physical data include temp., transparency and color; the chemical data represent specific conductance, pH, total residue, loss on ignition, total N, nitrite and nitrate N, total P, Cl, SO₄, and the spectral analytical detn. of Ca, Mg, Sr, Na, K, Fe and Mn. The nature of the bottom as well as the chemical character of the water plays an important rôle. The unattached and the feebly rooted spp. show a predilection for lakes rich in P with the exception of the carnivorous *Utricularia*. With respect to N the conclusion is not so definite, but all except *Utricularia* avoid the lakes most deficient in N. Lack of a closer correlation between these minimum substances and the occurrences of the various spp. may be due to (1) a small number of samples, (2) horizontal variations in the water of the lakes, (3) the same quantity of P or N may have an altogether different nutritive value for the different plants in the various lakes. Fe and Mn seem to affect the distribution of some spp., at least in some districts. In one case *Potamogeton zosterifolius* and *P. obtusifolius* showed a preference for waters rich in Fe and Mn, while *Ceratophyllum* showed a preference for waters deficient in these substances. Marked annual variations in the composition were found; these may be due to direct freezing, to frost heaving or to ice erosion. The final chapter is devoted to a

discussion of the relation of large aquatics to lake types.—*G. Lohammar.*

7230. MANNING, WINSTON M., C. JUDAY, and MICHAEL WOLF. Photosynthesis of aquatic plants at different depths in Trout Lake, Wisconsin. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 377-410. 1938.—Rates of photosynthesis at various depths were measured for several algae and for 3 large aquatic plants. The quantum efficiency of the CO_2 assimilation of *Chlorella* for various light intensities was calculated; for low light intensities the value was approx. 0.05, much lower than found by previous investigators. *Chlorella* showed a lower rate of photosynthesis at the surface than at depths of 2-3 m. *Cladophora* was the only alga that showed a maximum rate of photosynthesis at the surface on a clear day. Light adaptation was noted in *Spirogyra crassa*; one maximum was found at 0.5 m. and the other at 3 m. where the light intensity was approximately 3×10^4 ergs/cm²/sec., which was about the intensity at the depth where the material was collected. Only a single rate maximum was found in 2 other spp. of *Spirogyra* growing in shallow water. None of the large aquatics showed a diminished rate of photosynthesis at the surface; each gave a different type of rate-intensity curve.—*C. Juday.*

7231. MELOCHE, V. W., G. LEADER, L. SAFRANSKI, and C. JUDAY. The silica and diatom content of Lake Mendota water. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 363-376. 1938.—Diatoms were most abundant in spring and fall, with summer and winter minima. A definite decrease in silica was correlated with a marked increase in diatoms in Oct., but no definite correlations were noted at other seasons of the year. The quantity of silica varied from 0.4 to 2.5 ppm., a little more than a 6-fold difference. A uniform vertical distribution of both silica and diatoms was found during the vernal and autumnal periods of circulation of the water.—*C. Juday.*

7232. SCHWABE, GERHARD HELMUT. Beiträge zur Kenntnis isländischer Thermalbiotope. *Arch. Hydrobiol., Suppl.-Bd.* 6(2): 161-352. 8 pl., 26 fig. 1936.—Thermotopes or portions of the earth's surface with a temp. raised by terrestrial heat above that of their surroundings, are classified as thermae (hot-springs), fumaroles, and warm soils. In Iceland, the hot-springs, apart from certain acid springs transitional to fumaroles, are classified as (a) discrete, (b) diffuse and (c) waterline thermae. The discrete springs are divided into (a) limnothermae, basin-shaped and deeper than outflowing stream, (b) choanathermae, funnel-shaped, with continual or intermittent disturbance by gases, (c) tryblithermae, saucer-shaped and not deeper than the feebly inclined outlet, and (d) rheothermae, without basin and with a steeply descending outlet. The diffuse springs are "helothermae" in which the water oozes up into a swamp or among stones, and also springs submerged in rivers, lakes or the sea, or intertidal springs. The waterline springs are found along the edges of lakes and rivers, they are attributed to warm telluric water flowing over the cold water of surface origin. A detailed account of the thermotopes of 7 thermal fields is given with an analysis of temp. conditions and some chemical data. Bacteria alone occur above 80° C. A typical thermal Cyanophycean flora is only developed between 20° and 58-60° C, the latter temps. being the upper limit for a good growth of *Mastigocladus laminosus*; though it can apparently live as small pale growths up to 63° C. *Phormidium laminosum* is found up to 58° C but its optimum temp. is lower. The former species is entirely, the latter practically thermobiont. No other species occurs in Iceland above 50° C. At least 4 spp. are found in Iceland only in thermal waters. After the blue-green algae, diatoms are the most important element in the algal flora, but their upper limits of tolerance are hard to determine, many clearly live above 40° C. 9 spp. of diatoms, 25 of bryophytes and 6 of vascular plants are listed as occurring in Iceland only in thermotopes, though widely distributed in temperate Europe. The previously reported forms of the mollusc *Radix peregra*, supposedly confined to Icelandic thermae, are probably ecologically determined, the species shows great variability. The spider *Streptophaenus permixtus* is known in Iceland only from thermotopes. 4 spp. of Ostracods are also listed in the same category, but the Ostracods of the Icelandic

fauna are poorly known. Among insects, the Diptera *Lispa consanguinea fuscipes* and *Scatella thermarum* are endemic to Icelandic thermae. None of the animals can live above 47.79, the highest temp. for *S. thermarum*. Larvae of this species die at 49°-50°. *Gasterosteus aculeatus*, found living normally up to 32° C, die when placed in water at 34° C. 9 of the bryophytes, all the vascular plants, and the spider, if not some other animals, are to be regarded as outposts in the post-glacial recolonization of Iceland, unable to establish themselves except in thermotopes. Certain plants and insects found widely in southern Iceland, only colonize thermal habitats in northern Iceland. The thermal environment is seasonally affected only by light. Some plants (*Menyanthes trifoliata*, *Epilobium palustre*) flower earlier in warm soils around hot-springs than in non-thermal localities, and the outpost species of liver-worts, *Anthoceros levis* and *Fossombronia dumortieri* produce ripe sporogonia earlier than in temperate Europe. A number of the diatoms and the crustacea *Gammarus deubeni* (to 25° C), *Heterocypris salina* (to 42°) and *Cyprideis litoralis* (to 25°) are of marine origin and many other inhabitants of the thermae are euryhaline. *Scatella thermarum* produces eggs from April to Oct., but the life cycle must be interrupted by the dying down of the algae on which the larvae feed during the dark winter. Many spp. that can inhabit thermotopes occur in great quantity, presumably due to optimal thermal conditions and to lack of competitors. The thermal structure of a spring determines a zonation of organisms therein. The distribution of warmth-loving plants around a spring may be determined partly by the wind: *Hydrocotyle vulgaris* was found growing on the Southwest side of a thermal spring the steam of which protected the plant from chilling by the north wind. A marginal biocoenosis in intermittent thermae, a cyanophycean mat and the organisms living in condensation water are recognized as intermediate between aquatic and terrestrial thermal biocoenoses. At the surface of the *Scytonema varium* mat *Scatella thermarum* breeds and *Lispa consanguinea fuscipes* also occurs. From ledges overhanging hot-springs cyanophycean stalactites may develop in condensation water. In some localities surfaces moistened by condensation water support a rich growth of desmids in which *Cosmarium amoenum* is dominant.—*G. E. Hutchinson.*

7233. WHITNEY, LESTER V. Microstratification in inland lakes. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 155-173. 10 fig. 1938.—Results obtained with a transparency meter showed that the lower waters of 10 lakes, deep enough to be stratified, were separated into layers having marked differences in transparency; these strata varied in thickness from a few cm. to several m. Organic content of the water and numbers of bacteria were correlated with the transparency curve patterns.—*C. Juday.*

7234. WHITNEY, LESTER V. Transmission of solar energy and the scattering produced by suspensions in lake waters. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 201-221. 1938.—Measurements of the amount of solar energy transmitted to various depths by the waters of 16 Wisconsin lakes were made and also of the amount scattered upward by suspended particles at corresponding depths. From the results, equations were derived for the scattering coefficients and percentages; the latter ranged from 3-24%.—*C. Juday.*

WILDLIFE MANAGEMENT—AQUATIC

(See also in this issue Entries 7223, 8687, 8816, 8818, 8819)

7235. JUDAY, CHANCEY, and LAWRENCE E. VIKE. A census of the fish caught by anglers in Lake Kegonsa. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 527-532. 1938.—The total catch of fish in this lake during the 1936 fishing season was about 8,500 and they weighed 9,600 lbs. The area of the lake is 3145 acres, so that the yield was 2.7 fish per a. with a weight of about 3 lbs. per a. The bluegill was the dominant form; white bass ranked 2d.—*C. Juday.*

7236. JUDAY, CHANCEY. Fish records for Lake Wingra. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 533-534. 1938.—This lake has an area of 200 acres; it was seined with a half-inch mesh net long enough to extend entirely across the lake and the hauls extended the entire length.

The net caught 72,750 fish weighing about 71,500 lbs. The total catch amounted to 357 lbs. per a., of which 124 lbs. were game and pan fish, and 233 lbs. were rough fish, chiefly carp (209 lbs.). Making allowance for the small ones which escaped through the meshes of the net, the total fish population was estimated at 365 lbs. per a.—*C. Juday*.

7237. KUBO, I. Preliminary notes on the stock of the anadromous dog salmon, *Oncorhynchus keta* (Walbaum). 1. On the catch from the Miomote River. [In Jap. with Eng. synopsis] *Bull. Jap. Soc. Sci. Fish.* 6(5): 262-265. 1938.—Japanese text; English synopsis. 170 "common" and 22 "silvery" dog salmon sampled Nov. 20-23, 1936, from the Miomote River, Niigata Prefecture. Body measurements, weights, and scale studies do not indicate distinctions between common and silvery dog salmon. Body lengths ranged from 45 to 90 cm. with a mean of 72 cm. approx. Total weights ranged from 1 to 7.5 kg. with an approx. mean of 3.7 kg. Dog salmon ages ranged from 2 to 6 years with the 3-year and 4-year classes predominant as determined from scale readings. Tables give scale measurements as to thickness and distances between 1st, 2d, and 3d winter rings and peripheral margin of scale.—*S. J. Hutchinson*.

7238. LEONARD, J. W. Feeding habits of trout in waters carrying a heavy population of naturally hatched fry. *Copeia* 1938(3): 144. 1938.—A series of 14 brook trout (*Salvelinus fontinalis*) and one brown trout (*Salmo trutta*), ranging in standard length from 87-186 mm., was taken from Sweetwater Creek, Lake County, Michigan, on April 30, 1937. At this time newly hatched trout fry were very abundant in the stream. Despite this fact analysis of the stomach contents of the trout in the series mentioned revealed no trout fry, although presence of two small *Cottus* sp. showed that fish had been eaten.—*J. W. Leonard*.

7239. NEEDHAM, PAUL R. Trout streams. Conditions that determine their productivity and suggestions for stream and lake management. x+233p. Frontispiece, 74 fig. Comstock Publishing Co., Inc.: Ithaca, N. Y., 1938. Pr. \$3.—This book combines, in a very readable account, information on the life history, environmental requirements, foods and diseases of 10 of the more important Salmonid game fishes. Research and management methods are discussed and evaluated in terms readily understandable by the intelligent layman; yet accurately enough and in sufficient detail to be of value to the technical student. Strictly handbook materials, such as creel census, fish-scale collection and analysis, and field survey techniques and equipment have been assembled in an appendix. Natural methods of conservation are favored over indiscriminate introduction of non-native species and dependence on artificial hatching and stocking entirely, although it is recognized that artificial propagation has a place in the fisheries program. The need for adequate research in and properly regulated management control of aquatic resources is emphatically presented. Although streams receive most attention, lakes are not neglected. The chapters on Distribution of Trout Foods, Propagation, Stocking and Protection, and Stream and Lake Management should be of especial interest to individuals and organizations interested in promoting better trout fishing. In the bibliography, which contains more than 100 author entries, books of general interest are distinguished from those of a strictly technical character. References to illustrations are set in bold-faced type in the general index.—*L. M. Dickerson*.

7240. ORTON, J. H. Oyster biology and oyster-culture, being the Buckland Lectures for 1935. 211p. 57 fig. Edward Arnold and Co.: London, 1937. Pr. 5s.—Part I reviews all that is known of the biology of the oyster, its anatomy, mode of life and general ecology, habits, reproduction and life-history. Part II deals with the economic and commercial side of the oyster fishery, and, at every point, the full bearing of recently acquired scientific knowledge on the

problems facing the industry is clearly and succinctly brought out. The author emphasizes in which directions our knowledge is still incomplete, and suggestions for further research are made freely, particularly on such points as the failure of spat settlement in most seasons on English beds, the still unexplained summer mortality, the rate of spawning in relation to the laying of culch, and the rate of growth and development in relation to temp. The author gives as one of the essential requirements of a good producing oyster bed that there should be a local seasonal temp. range giving frequent probabilities of a maximum temp. in the bulk of the seawater of 64°F, or more, this being the opt. temp. for inducing spatting. He comments on the frequent failure of the spat and considers the cold summers with low water temps. as one of the most important contributory causes.—*From review by W. M. Tattersall (courtesy Ann. Appl. Biol.)*.

7241. SATO, R. On new migratory courses of salmon cleared by the tagging experiments in the fishing ground of northern North Pacific, 1936. II. *Oncorhynchus keta* (Walb.). *Bull. Jap. Soc. Sci. Fish.* 6(5): 251-261. 1938.—Japanese text; English synopsis. 14 fishes travelled new migratory courses. Salmon were tagged on the east coast of the Kamchatka peninsula as far north as Baron Korf Bay near Cape Obyutorsk. Some were recovered on the E coast of Kamchatka near the points of liberation; others rounded Cape Lopatka to enter streams on the west coast of Kamchatka. Salmon tagged near Simusir Island (Central Kuril group) entered the Sea of Okhotsk to be recaptured along the west shore of Kamchatka and at Tavisk in Okhotskii district. Others tagged near Shikotan Island and Paramusiro Island (Kuvil group) were recaptured at the mouths of streams in the vicinity of Okhotsk.—*S. J. Hutchinson*.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also in this issue Entry 8844)

7242. DACHNOWSKI-STOKES, A. P. Improvement of unproductive and abandoned peatland for wildlife and related uses. *Ecology* 20(2): 187-197. 1 fig. 1939.—A distinction is made between areas of peat along river courses, those bordering lakes and ponds, and those occupying flat or nearly level upland under conditions of rising or fluctuating water levels. Among the principal unfavorable effects prevalent in some areas are overdrainage, burning, salt accumulation, differences in the composition and properties of surface materials and variations in the sequence of layers of peat below the surface. The restoration of unproductive and abandoned peatland located with reference to coastal and continental migratory flyways would reestablish resting, feeding and breeding grounds for various forms of wildlife, insure the conservation and use of peat resources to purposes for which they are best adapted, and likewise make an important contribution to the program of submarginal land retirement.—*A. P. Dachnowski-Stokes*.

7243. NICHOL, A. A. Experimental feeding of deer. *Arizona Agric. Exp. Sta. Tech. Bull.* 75. 1-39. 16 fig. 1938.—In expts. conducted over a 3.5-yr. period 38 deer, spp. native to Arizona, were fed to determine the food requirements necessary for growth, maintenance, and reproduction. The coefficient 2.35 multiplied by the hundredweight of deer will give in pounds the amount of air-dry forage removed daily by the deer from the range. Palatability tests, run on 168 native plants, showed that shrubs make a dependable and substantial part of the deer diet, and that the tree forages, grasses, weeds, and annuals are also important. Details of the seasonal availability and palatability of plants represented by 26 spp. of trees, 16 spp. of grasses, 39 spp. of shrubs and vines, 19 miscellaneous plants, and 68 spp. of herbs and annuals are reported in infolded tables.—*Courtesy Exp. Sta. Rec.*

BIOLOGICAL ABSTRACTS

Editor-in-Chief, JOHN E. FLYNN; Assistant Editor, JEAN MACCREIGHT

VOLUME 13

JUNE-JULY, 1939

NUMBER 6

Entries 8868-10670

GENERAL BIOLOGY

Editors: A. H. GRAVES, *Plant*; C. A. KOFOID, *Animal*

(See also in this issue Entries 8896, 8900, 8903, 8976, 9105, 10028, 10081, 10201, 10265, 10294, 10360, 10382, 10531, 10670)

PHILOSOPHY OF BIOLOGY

8868. JORDAN, P. Zur Quanten-Biologie. *Biol. Zentralbl.* 59(1/2): 1-39. 1939.—Quantum biology deals with biological reactions which are dependent upon elementary physical processes. The killing of bacteria by heat and other agents in certain cases is an exponential function of time, analogous to the disintegration of radium. The probability of death of any particular individual is independent of the time that it has been exposed to the lethal temp. The death of an individual is not a progressive continuous process induced by the high temp.; on the contrary there is a spontaneous change to the lethal state, which is to be referred to a primary monomolecular process. A single molecule which has undergone a quantum transition has the capacity to induce the death of the bacillus. The cell contains an organ consisting of a quite small number of molecules which is designated the controlling center of the cell. Biol. reactions which are controlled by more than a single elementary act grade insensibly into those which are similar to processes of a macrophysical sort if the primary stage is composed of many elementary processes. The statistical analysis has led to the development of 2 formulae. X-ray injury, the production of mutations, the action of poisons and effective substances, u.-v. light sensitivity, division of single cells and the results of virus investigations are discussed as biological quantum effects.—*A. H. Hersh.*

8869. WHEELER, WILLIAM MORTON. Essays in philosophical biology. Selected by G. H. PARKER. With foreword by THOMAS BARBOUR. xv+261p. Frontispiece, illus. Harvard University Press: Cambridge, Mass., 1939.—In this volume the biologist has reading matter of the very first order. While, in point of time not every essay is new, every one of them is as brilliant and fresh as though it had been written yesterday. One notes that "Alfred North Whitehead once said that the late William Morton Wheeler was the only man he had ever known who would have been worthy and able to sustain a conversation with Aristotle. Something of Wheeler's unusual breadth of learning, something of his unique fund of humor, penetrated between the lines of everything he wrote. His formal books have influenced the world of scientific thought; and yet his delightful charm is to be found nowhere more vividly than in the occasional papers he wrote for various scientific journals. Unwilling to let these significant papers perish in the files of out-of-print magazines, some of Wheeler's friends have now gathered them into a book with the title, 'Essays in Philosophical Biology.' It is a memorial to Wheeler, but even more, it is a valuable addition to the small store of the world's highest scientific literature."—*A. P. Hitchens.*

TAXONOMY AND NOMENCLATURE

8870. FOSBERG, F. R. Nomenclature proposals for the 1940 Botanical Congress. *Amer. Jour. Bot.* 26(4): 229-231. 1939.—Motions of proposals to amend the Internat. Rules for Bot. Nomenclature, art. 30 (to clarify the status of epithets used to designate the typical subdivision of a species), art. 36 (to invalidate names published in advertisements), art. 60 (to typify names first published invalidly by the sense used when they are validated). Two generic

names proposed for conservation—*Artocarpus* Forst. 1776 (over *Sitodium* Parkinson 1773) and *Inocarpus* Forst. 1776 (over *Aniotum* Parkinson 1773).—*F. R. Fosberg.*

CONSERVATION AND NATURE STUDY

8871. HASKINS, CARYL P. Of ants and men. vii+244p. Frontispiece, 14 pl. Prentice-Hall, Inc.: New York, 1939. Pr. \$2.75.—A comparative study of the evolution and social behavior of ants and men is made, based upon a critical review of ant literature and observation of captive colonies. Consideration is given to the individuality of ants and men as well as to the social integration into larger biological units which parallel the multicellular organism. The totalitarian states of men and ants are compared. The various levels of social coordination of ants are reviewed together with the special phenomena of slavery, parasitism, war, competition and commensalism. The fate of the more primitive types of ants in competition with the advanced types is made the basis of comparison with similar events among human types and cultures. Errors of anthropomorphism are avoided. Ants and men are treated as analogous societies with different basic social mechanisms, but exhibiting convergence in many striking social attributes.—*A. Emerson.*

8872. WILBIS, ELIZABETH BAYLEY. Little bay creatures. 89p. Frontispiece, 3 col. pl., 45 fig. Illus. by M. ERCKENBRACK HENNESSY. Binford and Mort: Portland, 1938. Pr. \$1.50.—A child's book of animals of the littoral fauna of Puget Sound with accounts and figures of 44 spp.—*C. A. Kofoid.*

TEXTS AND EDUCATION

8873. BAKER, ARTHUR O., and LEWIS H. MILLS. (Edited by WILLIAM L. CONNOR). Dynamic biology. 2nd ed. x+732p. 13 col. pl., 691 fig. Drawings by EARL WOLF. Rand McNally and Co.: New York, 1938. Pr. \$1.80.—This is the first substantial revision of the authors' high school textbook covering a year's course in biology including botany, zoology, elementary physiology, and public health. The content is broken up into independent units each consisting of a preview, a list of problems, and a presentation of each, a summary, suggested activities by the pupil, a list of references and visual aids, charts, and films.—*C. A. Kofoid.*

8874. BUSH, GEORGE L., ALLAN DICKIE, and RONALD C. RUNKLE. A biology of familiar things. vi+695p. Col. frontispiece, 487 fig. American Book Co.: New York, 1939. Pr. \$1.92.—This is a high school textbook, richly illustrated, with emphasis upon the biology of things familiar to pupils of that age, but leading on to matters of individual and public health, conservation of natural resources, and an interest in pets, outdoor life, the causes of disease, sound habits of living, and facts of reproduction.—*C. A. Kofoid.*

8875. DE SOLA, RALPH (Editor). Reptiles and amphibians. An illustrated natural history. Prepared by workers of the Federal Writers' Project of the Works Progress Administration in the City of New York. With decorations by the W. P. A. Federal Art Project in the City of New York. 253p. 143 illus. Albert Whitman and

Co.: Chicago, 1939. Pr. \$2.25.—This is an illustrated natural history of the better known reptilians and amphibians to be seen in zoological gardens. It is illustrated with original photographs from life; charts of distr. of the crocodilians, the tuatara, the coecilians; the anurans, and the urodeles; the evolution of lizards; and the survival of turtles. There is an illustrated section on snake bite and a graphic presentation of the relative numbers of spp. of crocodilians, lizards, snakes, and amphibians with respect to the rest of the animal kingdom. The total number of animal spp. is estimated at 812,900.—*C. A. Kojoid.*

8876. HECTOR, J. M. Introduction to the botany of field crops. Vol. I, Cereals; Vol. II, Non-cereals. lxx+1127p. 448 fig. Central News Agency, Ltd.: Johannesburg, 1936-1938. Pr. £3.10 per set.—In 2 volumes the author has assembled a wealth of material on a wide variety of economic plants, usually classed as field crops. The first volume is devoted to the cereals; first a chapter treating of them in general, then successive chapters dealing in detail with oats, wheat, rye, barley, rice, millet, sugar cane, sorghum, and maize. Other grasses are considered very briefly if at all. The 2d volume deals with the Liliaceae, Moraceae, Polygonaceae, Chenopodiaceae, Cruciferae, Leguminosae, Linaceae, Malvaceae, Umbelliferae, Convolvulaceae, Solanaceae, Cucurbitaceae, and Compositae. Under each family there is a key to the several genera which contain species of economic importance, and at the end a comprehensive bibliography. The treatment throughout is predominantly from a systematic and structural viewpoint, although a few details of ecological or physiological significance are added. In so far as material has been available for compilation, the entire plant has been considered—anatomically, histologically, and cytologically. The illustrations are many, mostly excellent but variable in this respect. The author's thesis, as stated in the introduction, holds that a knowledge of form and structure of a plant enables the student better to understand its life processes; that the ecological viewpoint connects with the physiological. Familiarity with the reactions of a plant to its environment forms the groundwork for the study of crop ecology, a study which will pave the way to the development of an "adjusted agriculture."—*K. C. Hamner (courtesy Bot. Gaz.).*

8877. JOUBIN, L. Cours d'océanographie biologique (suite). XIV. *Soc. Océanog. France Bull.* 18(99): 1739-1740. 1938.—Descriptions of the ophiurids and euryalids, and a list of the depths at which certain spp. were found.—*J. A. Aplin.*

8878. NEWMAN, H. H. The phylum Chordata. A rev. of Vertebrate Zoology. xii+477p. 235 fig. Macmillan Co.: New York, 1939. Pr. \$3.60.—A text intended to supplement the traditional type of comparative anatomy course as taught in the laboratory. Leaving the details of anatomical studies to the realm of the laboratory, the author concentrates on the presentation of only enough generalized embryology and morphology to afford a background for the discussion of the evolutionary development of the various divisions of the phylum. In presenting this viewpoint, he arrives at a scheme of classification somewhat at variance with the usual one, but defends it as one that he believes to give a more nearly natural and a more scientific picture of the phylum. In addition to a treatment of the phylum as a whole, attention is given to the interrelations of the modern groups as interpreted in the light of knowledge based on the study of fossil forms. Emphasis is also placed on the general principles illustrated by each subgroup as well as those found in the study of the group as a whole. Significant aspects of the natural history of each unit adds a thread of unusual interest that weaves the whole into one compact story. Of particular value are the summaries of a number of principles and of their applications as found in the Chordata, such as Metamerism, Polyisomerism, Anisomerism, the Gradient Theory, Racial Age, Racial Senescence, and, in particular, the use of Homology as of basic importance in the study of Vertebrate Comparative Anatomy and Phylogeny. The illustrations are helpful, but do not seem to be quite up to the quality exhibited by the text.—*A. C. Walton.*

8879. WELLHOUSE, WALTER H., and GEORGE O. HENDRICKSON. College biology. 2nd ed. viii+391p. 166 fig. F. S. Crofts and Co.: New York, 1939. Pr. \$3.—The first

edition (1936) is here supplemented by numerous corrections and changes, some new illustrations and a new chapter on conservation. Both plants and animals are included.—*C. A. Kojoid.*

8880. WILSON, H. K. Some researches in education at the University of Minnesota. *Jour. Amer. Soc. Agron.* 31(3): 239-248. 1939.—As a result of studies of the relation between elementary botany courses and applied courses in agriculture, the botany courses have been revised to make them more applicable to the needs of agricultural students.—*H. K. Wilson.*

MISCELLANEOUS

8881. COMPTON, KARL T. Possibilities in biological engineering. *Ann. Internal Med.* 12(6): 867-875. 1938.—An address, discussing the possibilities of a closer working liaison between the biological, physical and chemical sciences, together with their applied aspects in medicine and engineering. "Just as systematic applications of physics and mechanical engineering to chemistry produced a useful art of chemical engineering, so a systematic application to biology of physics, chemistry and electrical engineering may create a useful art of biological engineering." A program by which biological engineering would fulfill its objective of systematically uniting physics, chemistry, mathematics and engineering to serve biology would involve 3 features—education, research, and organization.—There follows a discussion of the educational program in biological engineering under the headings of types of energy likely to be usable, ways and means in which these types of energy are likely to be involved, research equipment and technical skill, and fields of probable usefulness of biological engineers. Under the heading Research Program, the work of the Massachusetts Institute of Technology in the field of biological engineering is discussed.

8882. LITTLE, C. C. Some contributions of the laboratory rodents to our understanding of human biology. *Amer. Nat.* 73(745): 127-138. 1939.—Laboratory rodents have made great and lasting contributions to human biology in many ways. Some of these may be listed as follows: as test animals in relation to hormones and vitamins; for such tests as the Friedmann and Aschheim-Zondek; for work with influenza, yellow fever and other virus diseases; to show the limits of our knowledge concerning Mendelism in mammals; to demonstrate the need of large numbers of direct observations; by providing a life span of ideal duration for research in mammalian individuality, and in degenerative diseases such as cancer; by dividing the ranks of anti-vivisectionists and by restricting their objectives; by demonstrating the effect of injured germ plasm upon later generations; by showing the biological artificiality of such terms as "race," "strain," "family"; and by showing that little or no biological justification exists for the ideas of "superiority" and "inferiority" which agitate the world today.—*C. C. Little.*

8883. NOBLE, G. K. The experimental animal from the naturalist's point of view. *Amer. Nat.* 73(745): 113-126. 1939.—The naturalists have a varied interest in experimental animals, as the recent work in social behavior of vertebrates indicates. There has been an evolution of the social organization in this group from fish to man. Nevertheless, throughout this series the same components of social behavior may be recognized: (1) group attraction, (2) dominance behavior, (3) parental behavior and (4) suggestion. An improvement in the social organization has included: (1) a change from inborn species attraction to a learned group attraction, (2) from a dominance behavior, recognizing only the individual, to one recognizing groups, and (3) from a subordinate, that considers the dominant individual only as a despot, to one that considers the latter a protector and guide. At the fish level the mood of a member of a social group may be quickly transmitted by the character of the individual's movement to other members of the group. Among higher vertebrates these movements are supplemented by vocal expressions which have specific effects upon the behavior of individuals in the group. In the absence of the forebrain, no social behavior is complete in any vertebrate. Forebrain mechanisms essential for social behavior have shifted from the corpus striatum of fish and birds to the cortex of mammals. The elaboration of the cortex in the higher primates is correlated with an

increase in the importance of tradition and insight in regulating social behavior.—*G. K. Noble.*

8884. PIERSON, GEORGE MORRIS, and EDWARD LeROY BORTZ. The aging process: A medical-social problem. *Ann. Internal Med.* 12(7): 964-977. 1939.—Until recently there has been little scientific concern for the problems of Geriatrics, which has not received the systematic consideration accorded Pediatrics. Now that the onward march of medical science has controlled the ravages of youth the chances of reaching the later years of life are better than ever before; therefore, a study of the aging process as a medical and social problem is of practical importance. Modern medicine has been an outstanding factor in increasing life expectancy from 21 years in the 16th century to over 40 yrs. in the latter part of the 19th century. It is reasonable to assume that by 1960 a boy may expect to live to over 75 yrs. and a girl to 80 yrs. or more. This increase is due largely to improved knowledge of bacterial and parasitic diseases and a better understanding of human nutrition. Although more people reach middle life than ever before, once having attained the later yrs., there is no significant increase in the life span; therefore, the further prolongation of life depends upon a careful study of the forces that destroy life and to consideration of the precautions necessary to avoid them. The commonest and most readily controlled cause of interruption of human life is accidents in the home, factory and on the highway. E.g., automobile fatalities in the U. S. for 1932 numbered 29,451, 39,700 in 1937. Less than a century ago, communicable diseases caused 900 deaths per 100,000 of population. Now, except for tuberculosis and pneumonia, almost all the other infections have been largely eliminated as factors of importance. It is reasonable to assume that bacterial and parasitic diseases will soon cease to be factors in the interruption of the aging process. On the other hand, as more people reach middle age, the so-called degenerative diseases assume increasing importance as hazards to life. The medical problems of middle age have to do chiefly with the stamina of body tissues, their hereditary background and predispositions. With the decline in birth rate and the increase in the number of individuals living to mature age, the character and mind of the national population is slowly changing. The problem of aging is one of major importance and deserves more intensive study. The 2 most important metabolic diseases that interfere with aging are diabetes and obesity. Arteriosclerosis, certainly a form of tissue degeneration, is another outstanding menace to longevity. In extending the span of life, nutrition plays a dominant part. Man's place in future history will depend in no small part upon diet. Disorderly cellular growth and expansion—cancer—destroys 130,000 individuals each year in the U. S.; a proper understanding of this abnormal cellular activity will be invaluable in the extension of human life. With more people reaching middle life in good physical and mental condition, their value to society requires broader

recognition. Industry has been prone to underestimate the value of the worker over 40. This attitude will need modification if, as statisticians estimate, by 1960, 36% of the population will be between 40 and 65 years of age. With the increasing span of useful and productive life, the widespread tendency to retire individuals at a certain age will tend to displace many whose productivity and intellectual ability are undiminished. With more effective control of life-destroying degenerations, infections, malignancies, deficiencies and traumas the mature and productive years of man will be lengthened and the senile period shortened. An intelligent and well-conserved senectitude has important social and anthropological functions. The society which fosters research to save human life cannot escape responsibility for the life thus extended. It is for science not only to add years to life, but more important, to add life to years.—*G. M. Pierson.*

8885. VERRILL, A. HYATT. Wonder plants and plant wonders. xiii + 296p. Frontispiece, 8 pl., 49 fig. D. Appleton-Century Co.: New York, 1939. Pr. \$3.—Wonders, including many familiar forms, of the plant world are descr. in non-technical language; common or vernacular plant-names are used almost exclusively. The vast number and kinds of plants which contribute to man's welfare are described under the title, "The plant department store." But the accolade is given the palm trees as the most useful trees, supplying the greatest variety of articles useful to human beings, and to bacteria as the most wonderful plants. Relative strength and sizes of plants and animals are compared, a slender threadlike root of a tree will rend solid rock asunder; the largest extant whale or the mightiest prehistoric dinosaurs appear as puny creatures beside the giant sequoias of California, or the cypress trees of Mexico. In the chapter entitled "Intelligent plants," the author describes his expts. with certain sensitive plants the results of which lead him to conclude that "they actually learn to recognize individuals." Under "Magic plants," are descr. plants or plant-parts used in witches' brews, plants used or carried as potent charms by primitive peoples, and some curious modern survivals, e.g., breaking of a bottle of wine when a ship is launched. Other aspects of plants and plant-life are treated under chapters on: Plants that cure and kill; plants that sail the seas; plants that we eat; wonder plants that we drink; plants with strange uses; plant travelers; plant public enemies; plants of commerce and industry. In view of the increasing spread and menace of certain disease-transmitting ticks the following paragraph is quoted in its entirety: "Another member of the spider or mite family which is a terrible pest in the tropics and the South, as well as in some sections of the North, is the wood-tick or cattle-tick. Immune as are these pests to nearly all ordinary remedies, they cannot abide the odor of the common Osage orange, and a liberal use of the juice of the fruits rubbed on one's skin will afford greater protection from ticks than anything else known." An index is given.—*M. J. Fisher.*

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 9071, 9981, 10074, 10531)

HISTORY

8886. McATEE, W. L. (Editor). Journal of Benjamin Smith Barton on a visit to Virginia, 1802. *Castanea* 3(7/8): 85-117. 1 pl. 1938.—Numerous early popular names of plants are recorded. There were reports of an active "volcano, distant about 35 miles from Winchester," and apparently thermal belt planting was being done at Monticello. Effects of supposedly ascending lightning on a tree are noted. Fish are reported to die in warm spring water, evidently not from heat but from "fixed air"; and Bishop Madison, by adding soda and decanting some of the water, remedied this effect. Jefferson tells of walnut leaves used on bedding to drive away fleas.—*A. L. Pickens.*

BIOGRAPHY

8887. CALVERT, PHILIP P. Obituary Guillaume Severin. *Ent. News* 50(2): 58-60. 1939.—Translation of obituary of

this Belgian entomologist (1862-1938) by A. Lameere (*Bull. & Ann. Soc. Ent. Belg.* 78(8-9): 311-314. 1938), with addenda by the translator.—*P. P. Calvert.*

8888. THE EDITORIAL BOARD. Charles Rupert Stockard, February 27, 1879–April 7, 1939. *Amer. Jour. Anat.* 64(3): 379. Frontispiece. 1939.

8889. FRANK, L. K. T. Wingate Todd, January 15, 1885–December 28, 1938. *Growth* 2(4): [unpaged]. 1938.—Head of Anatomy Dept. of Western Reserve Medical School, Cleveland, Ohio, was especially interested in human growth and development from birth through adolescence.

8890. LEHMAN, G. Edgar Atzler. *Ergebn. Physiol.* 41: v-vi. 1939.—Edgar Atzler, Direktor des Kaiser-Wilhelm-Institute für Arbeitsphysiologie, and former student of Rubner died September 28, 1938. He was 50 yrs. old.—*C. R. Speakman.*

8891. McMULLEN, L., and E. S. PEARSON. William

Sealy Gosset, 1876-1937. (1) "Student" as a man, by L. McMULLEN. (2) "Student" as statistician, by E. S. PEARSON. *Biometrika* 30(3/4): 205-250. 3 pl., 3 fig. 1938 (1939).—These two articles under a common title contain some account of the life and work of Mr. W. S. Gosset whose contributions to the study of the theory and practice of statistics were published under the pseudonym of "Student." Mr. Gosset was a member of the scientific staff of Messrs. A. Guinness, Son & Co., Ltd., and most of his career was spent in their Dublin Brewery. His work involved the interpretation of exptl. results and routine analyses, as well as the solution of many problems in sampling. Nearly all his well-known contributions to the theory of statistics came in response to a need for solutions of practical problems with which he was faced in his industrial research; it is this characteristic aspect of his work which is given special prominence in the 2d article. Besides photographs, 2 plates show facsimile extracts from "Student's" notebooks of 1907, dealing with the Poisson distribution of the correlation coefficient. A number of personal letters dealing with his work and views are quoted fully or in part.—*E. S. Pearson.*

8892. REHN, JAMES A. G. Obituary B. Preston Clark. *Ent. News* 50(3): 90. 1939.—A native and resident of

Massachusetts (1860-1939) who published on the Sphingidae and formed the most outstanding collection of these moths in existence.

8893. TOLMAN, L. M. Wiley memorial lecture. No. IX. The history and development of food inspection in the United States. *Jour. Assoc. Offic. Agric. Chem.* 22(1): 27-36. 1939.—A review is given of some of the earlier laws dealing with the control of the production of food products, and it is shown how these gradually led up to the passage of the Food and Drugs Act of 1906. Particular attention is given to showing how some of our present food standards evolved, and how the Bureau of Chemistry assisted manufacturers in improving their products. Changes in our ideas of diet are also discussed, particularly as regards the presence and indispensability of certain trace elements.—*J. E. Webster.*

8894. ANONYMOUS. O. E. Schulz. *Notizbl. Bot. Gart. u. Mus. Berlin-Dahlem* 13(116): 154. 1936.—An obituary of Otto Eugen Schulz (1874-1936).—*H. St. John.*

8895. ANONYMOUS. Obituary Wilton Everett Britton. *Ent. News* 50(3): 90. 1939.—A national authority (1868-1939) on entomological subjects and state entomologist for Connecticut since 1901.

BIBLIOGRAPHY

Editors: CLARIBEL R. BARNETT AND MRS. EILEEN R. CUNNINGHAM

(See also in this issue Entry 10106)

8896. ASHBY, HELEN, HARALD RICHTER, ERIC ASHBY, and JOHANNES BÄRNER. German-English botanical terminology. An introduction to German and English terms used in Botany, including plant physiology, ecology, genetics, and plant pathology. xi+195p. Thomas Murby and Co.: London, 1938. Pr. \$3 net.—This book consists of chapters (p.1-136) dealing respectively with Plant Morphology (1, 2), Classification and Phylogeny (3, 4), Cytology and Genetics (5), Physiology (6), Ecology (7) and Plant Pathology (8) in which, on opposite pages in English and German are given a concise, simple account of the subjects designated above. The text is so written that almost every technical expression of any importance is defined. Sentence structure is so simple that, even without the literal English translation provided, a person with slight acquaintance with German should be able to read the German text without great difficulty. The texts are so written that the technical terms—which are printed in italics—occur in almost identical position on the opposite pages. The book is, therefore, both a dictionary—terms being defined cursorily, not in alphabetical sequence—and an easy introductory reader of scientific German. Exhaustive indexes to the English terms (p.167-181) and to the German (p.182-195) enable the user easily to locate any word. The indexes show the exceedingly wide range and comprehensiveness of the work as a compilation of definitions. Appendix I gives, in parallel columns, the common English, Latin and vernacular German names of some 700 plants or plant groups (families, orders), mostly crop plants, common flowering plants or weeds. Appendix II—A list of the most important common names of plant diseases—gives in parallel columns the English names of (a) the disease, (b) the host, (c) the cause, and the German expressions for (d) the cause, (e) host plant, and the disease. Appendix III a

gives the German expression and English equivalent of the abbreviations most commonly encountered in the German literature; Appendix III b similarly explains the abbreviations most commonly encountered in the English literature. The work is thoroughly modern, including technical terms which have recently made their appearance.—*S. E. F.*

8897. LA RIVISTA FORESTALE ITALIANA. Vol. 1, No. 1. March, 1939. 68p. Illus. AUGUSTO AGOSTINI (Director); ARIBERTO MERENDI, ALDO PAVARI, GIOVANNI SALA, RENATO SALDARELLI (Editorial Board). Issued Monthly. Istituto Poligrafico dello Stato, Libreria dello Stato, Rome. Pr. 4 lire, or 40 lire per annum (5 and 50 lire in foreign countries).—This journal, which takes the place of *L'Alpe*, aims to present the results of technical forestry work and to promote forestry throughout Italy. This issue contains: A. BRENGOLA, La carta forestale d'Italia (Forest map of Italy); A. PAVARI, Le razze forestali e la provenienza del seme (Races of forest trees and source of seed); G. SALA, L'autarchia nel settore dei prodotti legnosi (Autarchy in timber products); A. MERENDI, Le cure colturali ai boschi di nuovo impianto (Cultural care of newly planted forests); R. CIFERRI, Recenti vedute intorno alla classificazione dei pioppi (Classification of poplars); P. CARLONI, Per lo studio sistematico delle condizioni economiche della produzione forestale italiana (Systematic study of economic conditions of forest production in Italy); M. CANDELORI, Politica forestale e autarchia (Forest policy and autarchy); G. GIORDANO, Uno sguardo d'insieme alle foreste dell'Impero (Forests of the Empire); D. CRIVELLARI, Esperimenti di rimboschimento dei "magredi" dell'alta pianura occidentale friuliana (Reforestation of the western Friulian plateau).—*W. N. Sparhawk.*

EVOLUTION

(See also in this issue Entries 8878, 8903, 8921, 8923, 8937, 8999, 9035, 9679, 10158, 10577, 10660)

8898. GRIGGS, ROBERT F. The course of evolution. *Jour. Washington Acad. Sci.* 29(3): 118-137. 1939.—Orthogenesis is not necessarily a mystical doctrine. Evolution always follows a definite course—the same course in diverse groups of organisms such as vertebrates, flowering plants, and arthropods, i.e., the same orthogenetic trends occur over and over. The orthogenetic trends taken up, with numerous examples of each from various groups of organisms, include:

I. Aggregation of originally separate parts or individuals into units of a higher order. II. Reduction (A) In number, from many to few. (B) From indefinite to fixed and definite numbers. (C) Consolidation of loosely arranged parts into closely knit structures. (D) Coalescence of free parts into single units. (E) Elimination of some organs. III. Differentiation of parts originally similar—of which progressive sterilization with differentiation of structures accessory to

the sex organs is a special case. IV. Substitution of one function for another. V. Annexation of accessory parts. VI. A narrowing of the possibilities of evolution with progress from the primitive condition. The taxonomy of all groups of plants and animals should be made to conform with the orthogenetic trends; this undertaking is difficult because each of the orthogenetic trends is independent of the others. The cause of orthogenesis may be found in competition among organs as among the buds of a tree whereby the fittest, i.e., the most useful to the whole organism or those best placed to secure nourishment are the ones which survive. Since, as is generally agreed, orthogenetic trends are not necessarily adaptive, those who attribute all of the orderliness in the natural relationships of organisms to the natural selection of random variations have a difficult proposition to maintain.—*R. F. Griggs.*

8899. HUFF, CLAY G. Studies on the evolution of some disease-producing organisms. *Quart. Rev. Biol.* 13(2): 196-206. 1938.—Since little is known about the evolutionary development of most of the organisms producing disease, an attempt is made here to approach the subject from a study of the relation of contemporary parasites to their hosts. The organisms chosen are all arthropod-borne and belong to the rickettsiae, the spirochaetes, and the protozoa; they all represent parasitism of a high degree in which there are no longer any free-living stages. The evidence seems to indicate that parasitism among these groups began in the invertebrates and was secondarily transferred to vertebrates when the invertebrate hosts became blood-sucking. Indications that a given parasitism is older in one host (the invertebrate) than in the other (the vertebrate) are: its lack of pathogenicity in the older host, its relative efficiency of transmission in the older host (e.g., from parent tick to offspring through the eggs of the parent), degree of parallelism between the evolution of the parasite and the host, and degree of parallelism between the life cycles of parasite and host. The author stresses the usefulness of this method of approach to an otherwise very difficult problem.—*H. G. Swann.*

8900. MILLER, HUGH. The genus and species in relation to evolution and to system. *Amer. Nat.* 73(744): 93-95. 1939.—The taxonomic problem of the relation between the genus and the species is a relic of pre-Darwinian science, which expected natural forms to fall into a complete hierarchical system of species, genera and higher levels. This system of nature lent objectivity to the naturalist's classification. It was superseded when Darwin showed generic characters to refer to actual differentiations occurring in the past. Darwinian science allows actuality only to individuals and species. Generic relationship is logical only. Questions as to the objectivity of a genus are really questions as to past and present interactions of the members of the species involved.—*H. Miller.*

8901. RAHN, OTTO. Building stones to a chemistry of evolution. *Amer. Nat.* 73(744): 26-43. 1939.—All deductions are based on the assumption that evolution depends largely upon the formation of new types of hereditary units, e.g.,

genes. They can be formed only by chemical reactions, and consequently should be produced according to the laws of chemistry. While the actual reagents involved are unknown, some general laws can be applied successfully, and statistical evidence seems to justify the following statements: The frequency of the creation of a new hereditary unit in any given species is proportional to the number of individuals born per year. This is made probable by a survey of the plants of North America among which the rare families have few species while the common families have many spp. The frequency of the creation of a new hereditary unit in any given species is greater in warmer climates because chemical reactions proceed more rapidly at higher temps. This is borne out by the evidence that among reptiles, there are about 8 times as many species in tropical climates as in moderate climates while with mammals whose reaction temp. is constant the ratio is only 2:1. The number of species of plants also increases with the temp. of the country. This evidence indicates further that the formation of new hereditary units is not caused by cosmic rays or any other kind of radiation because the rate of reactions which are caused by radiation is independent of the temp., and statistical evidence shows a dependence. Polyploidy is probably not caused by chemical reactions, for it shows no relation to the number of spp. existing, nor does it increase with temp. A change of environment is likely to affect cell chemistry, and to induce new reactions which might lead to the formation of new hereditary units. The frequency of such reactions should be proportional to the frequency of environmental changes. This is largely a question of size. Some microscopic organisms may change their environment daily on an enormous scale, e.g., intestinal or soil micro-organisms. Variation in bacteria is so common that in several groups, species definitions are arbitrary because all shades of intermediate forms between any 2 "established" spp. have been described.—*O. Rahn.*

8902. SCHAFFNER, JOHN H. Extraordinary developments at or near the ends of evolutionary series. Studies in determinate evolution, XI. *Ohio Jour. Sci.* 39(2): 67-82. 1939.—When the taxonomic groups of plants are arranged in proper phylogenetic series in agreement with their advancement in complexity of reaction systems, at the ends of such series, especially the higher ones, extreme developments frequently occur which are rarely in evidence in the lower levels of the series. Such extreme developments are specific in a given series, even though the general evolutionary developments in the various series have been essentially similar. While the specific cause is unknown, these mutative characters appear to be associated with the highly specialized and complex aggregations of hereditary potentialities in the evolved protoplast. The present paper presents about 150 such characters in 80 genera of plants chosen throughout the plant kingdom. Comparable variations are also cited in certain insects and birds, and to a much greater extent in man.—*L. Lampe.*

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. MCCLUNG, *Animal*

(See also in this issue Entries 8876, 8896, 8921, 8924, 8925, 8926, 8935, 8940, 8941, 8944, 8950, 8954, 9690, 9789, 10103, 10515, 10516, 10522, 10528, 10642)

GENERAL

8903. MCCLUNG, C. E. Chromosome phylogeny. *Proc. Nation. Acad. Sci. U. S. A.* 24: 439-445. 1938.—After reviewing the main characteristics of genes and chromosomes the author advances the following hypotheses: that the gene, as the fundamental biological unit, has ultimate properties beyond physical science; that the gene (life) arose in direct response to the environment; that the gene, beside duplicating, diversifies by divisions asymmetrical with respect to the substratum; that such divisions produce not only a spatial but a temporal seriation of the genes in the chromosome, in which in general the most proximal genes are the oldest; that the temporal sequence of addition involves also a temporal sequence of function during de-

velopment; that the "inactive" proximal chromosomal regions represent the sites of genes controlling comprehensive early embryological characteristics.—*J. B. B.*

8904. STERN, CURT. Somatic crossing-over and somatic translocations. *Amer. Nat.* 73(744): 95-96. 1939.—Discussion.

PLANT

8905. BALDWIN, J. T. Jr. Chromosomes of the Diapensiaceae. A cytological approach to a phylogenetic problem. *Jour. Heredity* 30(4): 169-171. 1 fig. 1939.—Chromosome counts for 1 sp. in each of the 5 genera of Diapensiaceae show *Galax aphylla* to be the only known polyploid in the family. It has 24 somatic chromosomes and has the most southerly range of the 13 spp. known in the family.

Diapensia lapponica $n=6$, $2n=12$, is circumpolar in distr. Thus the family contradicts the inference that low temp. is less limiting as a factor in the distr. of poly- than of haploids. Polyploidy coincides with taxonomic division of tribal rank. Cyto-ecological relations of plants should be investigated experimentally.—*L. M. Dickerson.*

8906. BEAL, J. M. Cytological studies in relation to the classification of the genus *Eucalochortus*. *Bot. Gaz.* 100(3): 528-547. 40 fig. 1939.—14 spp. in the *Eucalochortus* section, 13 spp. and 5 vars. in § *Mariposa*, and 1 species in § *Cyclobothra* were investigated. Somatic chromosome numbers of 12, 14, 16, 18, 20, 21, 28, 32, and 40 were observed. A rearranged classification, based upon both cytological and morphological criteria, is presented as outlined by Mr. Marion Ownbey, in which all spp. with a basic number of 10 chromosomes and having capsules winged on the angles are placed in § *Eucalochortus*. Those with some basic number other than 10 and having capsules not winged are placed in § *Mariposa* except *C. plummerae*, with $n=9$ chromosomes, which for other reasons is placed in the *Cyclobothra* section. Seven is suggested as the basic number of chromosomes for § *Mariposa*, and perhaps also for the genus. Evolution of spp. with chromosome numbers lower or higher than 14 may have occurred through "dislocation" as postulated by Navashin; or increases in numbers may have resulted through fragmentation of medianly or submedianly constricted chromosomes through the attachment constriction so as to give to each of the arms a functional portion of the centromere.—*J. M. Beal.*

8908. MANGENOT, G. L'action de la colchicine sur les cellules végétales. *Compt. Rend. Acad. Sci. [Paris]* 208(3): 222-224. 1939.

8909. MIDDENDORF, FREDERIC G. Cytology of dormancy in *Phaseolus* and *Zea*. *Bot. Gaz.* 100(3): 485-499. 19 fig. 1939.—Seeds of *P. lunatus*, *Zea mays*, and *Pisum sativum* were fixed in various fluids, and stained by both iron-haematoxylin and the Feulgen reaction. In the dormant state the cell is plasmolyzed; the nucleus has an irregular form, apparently losing its membrane or limiting structure; the nucleolus is not optically differentiated by fixation although it may stain intensely with iron haematoxylin. Vacuoles are small, and the mitochondria are small granules or spheres. At germination the cell becomes turgid; the nucleus regains a normal spherical form and the boundary becomes definite; the nucleolus becomes optically differentiated even when unstained as by the Feulgen reaction, and shows a vacuolated structure. The vacuoles of the cytoplasm enlarge, and the mitochondria elongate into rods or filaments. Prior concepts regarding the chromatin of the dormant cell as having migrated centrifugally (Hickernell) or centripetally (Kater) are rejected on the basis of the Feulgen reaction.—*F. G. Middendorf.*

8910. WANSCHER, J. H. Contributions to the cytology and life history of apple and pear. *K. Vet.- og Landbohøjskole Aarskr. [Copenhagen]* 1939: 21-70. 1939.—The chromosome numbers of 90 vars., in part Danish, of apples and pears are reported; 13 vars. were triploid. The cause of variation in pollen quality within the diploid and triploid groups is discussed. The development of the embryo-sac of the diploid Cox's Orange is compared with that of the triploid Bramley. Endosperm formation was investigated in these and 3 other apple vars. with especial emphasis upon the rhythm of nuclear divisions and cell wall formation. Mitoses in young embryo sacs proceed as double waves beginning in the middle and running towards the ends; cell formation proceeds in a single wave from micropyle towards the chalaza. During the resting period before cell walls are formed, the free endosperm nuclei may fuse in twos, even twice. In one case 6-ploid and 12-ploid fusion nuclei were observed to divide twice by amitosis before primary cell wall formation.—*J. H. Wanscher.*

ANIMAL

8911. BERRY, R. O. Observations on chromosome elimination in the germ cells of *Sciara ocellaris*. *Proc. Nation. Acad. Sci. U. S. A.* 25(3): 125-127. 1 fig. 1939.—In both sexes, one chromosome is simultaneously eliminated from all of the cells of the germ line after their migration to the gonadal position. This is effected by an apparently autonomous

migration of the chromosome through the nuclear membrane into the cytoplasm during the resting stage.—*J. B. B.*

8912. CARLSON, J. GORDON. Mitotic behavior of induced chromosomal fragments lacking spindle attachments in the neuroblasts of the grasshopper. *Proc. Nation. Acad. Sci. U. S. A.* 24: 500-507. 6 fig. 1938.—X-ray-induced chromosomal fragments in dividing neuroblasts of *Chortophaga viridifasciata*, although lacking spindle attachments, show similar behavior and distribution to the chromosomes, indicating that polar repulsions effect the equatorial position at metaphase; that the separation of the chromatids is autonomous; that the orientation and migration toward the poles is due either to protoplasmic currents or to an expanding "Stemmkörper" (Bélár); and that the kinetochore functions mainly in making the orientation and separation of the chromosomes uniform and equal. Evidence for delayed attachment of fragments to broken chromosome ends is presented and suggested as an explanation of "delayed fragmentation."—*J. B. B.*

8913. COOPER, KENNETH W. Concerning the origin of the polytene chromosomes of diptera. *Proc. Nation. Acad. Sci. U. S. A.* 24: 452-458. 1938.—From an analysis of the literature on dipteran polytene (salivary gland type) chromosomes the author suggests that they arise during development in larval tissues fated for histolysis by duplication (polyploidy) and somatic synapsis of chromonemata which uncoil but are prevented from separating by a pre-metaphase mitotic block. Berger's multiple complexes are represented as an intermediate stage in this process. The radial polytene synapsis is considered as arguing against Darlington's precocity theory.—*J. B. B.*

8914. FUJII, S. An evidence for the presence of inert regions in the autosomes of *Drosophila virilis*. *Cytologia* 9(2/3): 177-184. 9 fig. 1938.—Evidence for the presence of inert regions in the autosomes was obtained from a study of the translocations, 83 III-IV tr. and 126 III-V tr. A discrepancy between the length of the oögonial chromosomes and that of the salivary chromosomes in 202 III-V tr. indicates that nearly half of each autosome is made up of inert material. β -heterochromatin is present at the proximal ends of all but the 3d and 6th chromosomes. The proximal half of the 3d is genetically inert, but no evidence has been obtained whether such is true also for the 6th. Though the proximal halves of all the autosomes are probably inert, β -heterochromatin does not correspond to the inert regions. The spindle attachment of the 4th chromosome is at the "other end" of plexus, and that of the 5th is to the right of peach.—*A. Hecht.*

8915. GATENBY, J. BRONTÉ, B. N. SINGH, and K. M. R. BROWNE. Further notes on the association between Golgi apparatus and the vacuole system in *Euglena* and *Copromonas*. *Cellule* 47(2): 227-236. 14 fig. 1938.—Osmiophilic material associated with the flagellum-vacuole complex in these flagellates is referred to as Golgi apparatus. It does not stain with neutral red, does blacken with osmic acid. It has a net-like form, is vacuolated or has other morphological variations. Because of its relation to the contractile vacuole and to secretion granules in many metazoa, it is assumed that dehydration may be a fundamental function of the Golgi apparatus.—*H. Hibbard.*

8916. HUSTED, L., F. F. FERGUSON, and M. A. STIREWALT. Chromosome association in *Mesostoma ehrenbergii* (Focke) Schmidt. *Amer. Nat.* 73(745): 180-185. 2 fig. 1939.—*M. ehrenbergii* was reported from Europe by Focke in 1836. Since then it has been found in Asia, Trinidad, and in 5 states of the U. S. The European form has 10 chromosomes with approximately median centromeres. The 11 individuals of the American form examined have 8 chromosomes. Each pair is easily distinguished from the others. The 2 shortest chromosomes are ca. 14μ long and the 2 longest ca. 27μ at mitotic metaphase. These are the largest chromosomes found in American Turbellaria. In the primary spermatocyte 3 bivalents occur and 2 chromosomes, always the same chromosomes, remain unpaired.—*Authors.*

8917. NOZAWA, K. On the voluminal relation between the ectoplasm and endoplasm in a heliozoon, *Actinosphaerium eichhorni* (Ehrenberg). *Cytologia* 9(2/3): 185-192. 6 fig. 1938.—The equation $y = bx^b$, in which b and k

are constants, x the vol. of the endoplasm and y the vol. of the ectoplasm, expresses voluminal relations between the ectoplasm and endoplasm of *A. eichhorni*. This same equation has previously been used to express relative growth in metazoa. That daughter individuals produced by artificial plasmotomy show the same voluminal relation as shown by the mother individuals is presented as evidence that a definite voluminal relation between endoplasm and ectoplasm is necessary for life in this organism. Although b and k are the same for all the individuals in the same culture dish at a given moment, these values are not fixed, but fluctuate within a wide range according to the environment. In ordinary pond water b is larger and k smaller than in old culture media.—*A. Hecht*.

8918. POLLISTER, ARTHUR WAGG. Centrioles and chromosomes in the atypical spermatogenesis of *Vivipara*. *Proc. Nation. Acad. Sci. U. S. A.* 25(4): 189-195. 1 fig. 1939.—During the development of the atypical spermatocytes in an unidentified snail (*Vivipara*) ($2n=18$), 16 of the chromosomes disintegrate and 16 extra centrioles appear. The kinetochore regions of the 16 abnormal dyad-chromosomes have evidently been transferred to the cytoplasm where they form normal centrioles.—*J. B. B.*

8919. POLLISTER, ARTHUR WAGG. The structure of the Golgi apparatus in the tissues of Amphibia. *Quart.*

Jour. Microsc. Sci. 81(2): 235-271. 5 pl. 1939.—In all tissues of Amphibia the Golgi apparatus is lamellar. In epithelia it typically approximates the form of a vertical collar in the distal end of the cell; in leucocytes it is a horizontal collar, or plate with a central perforation, located near the center of the main mass of cytoplasm. In smooth and cardiac muscle this horizontal collar is greatly elongated. In cells of cartilage and bone, and in odontoblasts the apparatus is a network of narrow strands. There is a complex plate-work in smaller nerve cells; some larger ganglionic cells contain a considerable number of separate Golgi platelets. The lamellae are uniform in thickness in all cells, approximating 0.2μ ; and they appear to have the properties of an elastic solid. On the basis of orientation of centrioles and Golgi apparatus all cells of Amphibia may be assigned to 1 of 2 groups: the epithelial or physiologically polarized type; or the leucocyte, or physiologically unpolarized type.—*A. W. Pollister*.

8920. ZUITIN, A. I. New data on the chromosome number in yak (*Poëphagus grunniens* L.). *Compt. Rend. (Doklady) Acad. Sci. URSS, Nouv. Sér.* 19(3): 201, 202. 3 fig. 1938.—Study of the spermatogonial metaphase from yak testes showed the diploid chromosome number to be 60. The sex chromosomes X and Y were usually situated at the periphery of the equatorial plate.—*Courtesy Exp. Sta. Rec.*

GENETICS

Editors: ORLAND E. WHITE, *Plant*; SEWALL WRIGHT, *Animal*

(See also in this issue Entries 8882, 8896, 8903, 8904, 8908, 8981, 9024, 9421, 9462, 9599, 9655, 9678, 9731, 9771, 9776, 9789, 9863, 10139, 10140, 10142, 10143, 10156, 10268, 10305, 10306, 10315, 10362, 10417, 10418, 10594, 10615, 10642, 10660, 10664)

GENERAL

8921. ANDERSON, E. The hindrance to gene recombination imposed by linkage: An estimate of its total magnitude. *Amer. Nat.* 73(745): 185-188. 1939.—Linkage imposes severe restrictions on kinds of recombinations when gene differences exceed 2 per cross-over segment. Restriction in an F_2 approximates $\left(\frac{2n}{2^n}\right)^N$ when n = number of gene differences per cross-over segment and N = number of such segments. This restriction is in addition to that imposed by frequencies. It represents the upper limit of total recombination which may be achieved in an infinitely large F_2 . The actual recombination in natural or artificial species hybrids is an infinitesimal fraction of total imaginable recombination.—*E. Anderson*.

8922. DOVE, W. FRANKLIN. The needs of superior individuals as guides to group ascendance. *Jour. Heredity* 30(4): 157-163. 2 fig. 1939.—The theory of aggrid ascendance—a theory utilizing the combined positive elements of both the innate and the acquired traits, of both evolution and conditionability and derived from the needs of the aggridant (superior) type, is developed in terms, (1) of nutritional need-satisfaction in relation to inter-individual growth rates of exptl. animals, and (2) of economic need-satisfaction in relation to inter-individual town population growth rates. The aggridant, whether for individual organism or for town, is represented as a type situated between the mean and the maximum of the group array of individual units differing serially in growth rate. At this locus 6 patterns and characteristics of need satisfactants are indicated as clues for the transference of aggridant superiority to other groups.—*W. F. Dove*.

8923. MONTALENTI, GIUSEPPE. *Elementi di genetica*. vii+452p. 122 fig. L. Cappelli: Bologna, 1939.—This book, as Professor Ghigi says in his preface, fills the need of a general elementary exposition of the subject of genetics in Italian. It is based on the author's course of lectures at the Univ. of Rome. Classical genetics, as well as the most recent developments, is presented in its biological setting, with carefully and logically constructed approach to every aspect, so that the book is suited to lay readers. Factual material is presented as selected examples, supplemented by critical summaries. Historical and theoretical aspects are stressed; organisation and logical development of the subject are the most impressive features. Apart from the

introduction, the text is divided into 8 major parts: 1) the biological bases of genetics and their historical development; 2) variation (including a discussion of Lamarckism); 3) Mendelism (chapters on the Mendelian laws, interaction of factors, anomalies); 4) the chromosome theory (chapters on the cytological features of reproduction, the relation of chromosomes to Mendelian phenomena, linkage, *Drosophila* genetics, crossing-over and localisation of genes, discussion of the chromosome theory, interspecific hybrids, nucleus and cytoplasm in heredity); 5) mutations; 6) sex (chapters on theory of sex-determination, intersexuality and sex reversal, determination of secondary sex characters); 7) phenogenetics (developmental and physiological genetics); 8) applications of genetics (to interpretation of evolution, to eugenics, agriculture, and animal breeding). There is a selected list of references in connection with each chapter; also author and subject indexes.—*D. Rudnick*.

PLANT

8924. ANDERSON, E. G. Translocations in maize involving chromosome 8. *Genetics* 24(3): 385-390. 1939.—Data are presented on linkage relations with ms_8 and j_1 for 9 translocations in maize which involve chromosome 8. The cytological positions of 7 of these were detd. These together with T8-9a studied earlier by Burnham, show the following relationship: The genes ms_8 and j_1 must be in the distal fourth of the long arm of the chromosome with j_1 nearest the end. One of the translocations studied is in the short arm, the others in the long arm between the spindle attachment and ms_8 .—*E. G. Anderson*.

8925. BLAKESLEE, ALBERT F. The present and potential service of chemistry to plant breeding. *Amer. Jour. Bot.* 26(3): 163-172. 11 fig. 1939.—Research with colchicine is used as an illustration of the value of chemistry to plant breeding. Colchicine fails to double chromosomes in corn of *Colchicum* from which it is obtained. Colchicine caused chromosome doubling in 65 kinds of flowering plants included in 41 spp., 24 genera, and 14 families. Chromosome number was doubled in ♂ and ♀ *Marchantia polymorpha*. Fungi appear immune to colchicine. In *Portulaca*, 1n flowers may equal 4n flowers in size. In addition to doubling, colchicine may cause elimination of chromosomes resulting in 2n-1, 4n-1, and 4n-2 types. Haploids may readily be induced to form 2n capsules by colchicine treatment. If methods were devised for inducing 1n offspring from hetero-

zygous parents, doubling their chromosomes should give homozygous races. ♂ and ♀ tetraploids were induced in hemp, *Lychnis*, and spinach. Simple are distinguished from multiple polyploids. Methods are given of origin, from sterile double haploids $2(1n)$, of fertile double diploids $2(2n)$ and double tetraploids $2(4n)$. Chemical methods are desired for following: identification of genetic types by chemical treatment; induction of shoots from single cell cultures; induction of crossability in species hybrids; bringing arrested hybrid embryos to maturity; induction of reduction divisions in any part of plant; securing large chromosomes in plants like those in salivary glands of *Drosophila*; development of rusts and other parasitic fungi on artificial media.—A. F. Blakeslee.

8926. BLAKESLEE, A. F., and H. E. WARMKE. Size of seed and other criteria of polyploids. *Science* 88(2289): 440. 1938.—As criteria the following were found useful in preliminary separation of the even-balanced $4n$ from normal $2n$ individuals in plants: (1) Larger pollen grains in $4n$ flowers, (2) larger $4n$ seeds, (3) larger stomata, (4) leaves increased in width, thickness, and depth of green color, (5) larger size of floral parts, and (6) shorter, stouter fruits. For odd-balanced types (e.g., $1n$ and $3n$) criteria (3) to (6) are usable, but the proportion of aborted pollen grains is indicated as a better criterion. The more complex problem of criteria applicable to dioecious plants is discussed.—*Courtesy Exp. Sta. Rec.*

8927. BRANAS, J., L. BERNON, et L. LEVADOUX. La genétique en Viticulture. *Progr. Agric. et Vitic. Suppl.* 110 (39): 1-8; (40): 9-16; (41): 17-24. 1938.—Reviewing hybridization through the last 50 yrs., the authors conclude that Mendel's laws apply to *Vitis*. Little was done to hybridize *Vitis* until phylloxera created the demand for resistant stocks adapted to various environments. (1) In binary hybrids the specific aptitudes of the parents are not necessarily blended, thus, the direct producer 5813 S which is 4/8 vinifera should only have a medium resistance to mildew, yet it is very resistant. (2) The similarity of appearance of a hybrid to one of the parents does not mean a similarity of character. (3) The color or lack of color of the juice of parents is variously transmitted in hybrids. Thus an Aramon with uncolored juice crossed with a Teinturier, with colored juice, gave a Petit Bouschet with a colored juice of half intensity of that of Teinturier. If T is colored juice and t uncolored juice, we can write: $TT \times tt = Tt$. However, some vars. with uncolored juice seem to have a t_2 color factor to which the above rule does not apply. The heterozygote Tt_2 may have as much color as TT , t_2 being recessive and T dominant. Apparently *Vitis* hybrids follow this rule: if (f) is a hermaphrodite flower and (F) a ♂ flower, the heterozygote Pf will have ♂ flowers, the hermaphrodite being recessive. Some work has been done for the improvement of table grapes but very little for wine-making vars. Until recent years the hybridizing of resistant stock with *V. vinifera* to produce direct producers resistant to phylloxera was made haphazardly, and the resistance developed has not been a success. However, some varieties have proved very resistant to the attacks of fungi. Better results have been obtained in adaptation to difficult soils. Thus *V. solonis* resists NaCl but is not phylloxera resistant. When crossed with *riparia* (very resistant to phylloxera), *V. solonis* \times *V. riparia* 1616 C was obtained that resists phylloxera and salt. However, it yellows in chalky soils. *V. solonis* \times *V. berlandieri* 45 EM (f) does well in chalky soils, in salty soils and is resistant to phylloxera. There is no doubt that much will be done with modern technic.—E. H. Twilight.

8928. COCHRAN, H. L. A chlorophyll deficient pimiento. *Jour. Heredity* 30(3): 81-83. 2 fig. 1939.—Among 20,000 pimiento plants grown for exptl. purposes in 1938, 1 plant was observed with a chlorophyll deficiency, the first to be reported in the genus *Capsicum*. Only one half of the plant was affected. The deficiency was exhibited in the leaves, young buds, flowers and fruits. All fruits abscised before their seeds were mature enough to germinate.—H. L. Cochran.

8929. COOK, O. F., and J. F. JOYNER. *Neanthe*, a palm for genetic study. Variations in form and behavior. *Jour. Heredity* 30(3): 92-103. 7 fig. 1939.—Variations in form and

behavior of *Neanthe*, a small palm, are described and illustrated. Among them are small size, relatively prompt germination of seed, short juvenile period and long life. The plant may be brought to fruiting age in a 4-inch flower pot. Possible methods of establishing breeding stocks adequate for genetic studies are discussed briefly.—L. M. Dickerson.

8930. DAHMS, R. G., and F. A. FENTON. Plant breeding and selecting for insect resistance. *Jour. Econ. Ent.* 32(1): 131-134. 1939.—The control of insects by the use of resistant vars. seems to be the most feasible method of controlling insects of some plants. For best results, the problem requires the cooperation of entomologist, plant breeder and agronomist. Heavy uniform infestation by the insect is desirable, but often difficult to secure in resistance studies. Insect resistance in many cases is known to be an inherited character. By proper selection, insect resistant vars. are often obtained, but these usually must be crossed with other vars. before resistant vars. possessing desirable agronomic characters are secured. Development of resistant vars. by breeding is a slow process. It is possible that there may be more than one strain of an insect, and that a var. may be resistant to one strain but not to another. The cause of insect resistance in plants is complex and in some cases is known to influence the biology of the insect itself.—*Auth. summ.*

8931. DALE, E. E., and OLIVE L. REES-LEONARD. Plastid variegation and concurrent anthocyanin variegation in *Salpiglossis*. *Genetics* 24(3): 356-367. 13 fig. 1939.—A type of variegation in which one gene produces variegation in both the leaves and the flowers is reported in *Salpiglossis*. The variegated areas show sharply defined spots in which plastid development is inhibited, the chloroplasts being affected in the leaves and the chromoplasts in the flowers. Variegation in anthocyanin-flowered types produces a secondary effect of the plastid modification upon the flower color such that the flowers appear anthocyanin-variegated. There is evidence of reduction in the amt. of cell division in the non-green as compared with the normal green palisade cells of the leaf. In both the leaves and the flowers the direction of change is apparently from "normal" to "pale." The variegation is inherited as a monohybrid recessive.—*Authors.*

8932. EMERSON, R. A. A zygotic lethal in chromosome 1 of maize and its linkage with neighboring genes. *Genetics* 24(3): 368-384. 1939.—A Bolivian maize with mosaic pericarp and cob was found to have a recessive zygotic lethal, zl , closely linked with the pericarp-color gene, P , and the near-by genes male-sterile 17, ms_{17} , and tassel-seed 2, ts_2 . The effect of zl was to prevent the development of 25% of the kernels of self-pollinated ears, i.e., kernels homozygous zl . This tended to prevent homozygosis of genes closely linked with zl , and thus to change a 3:1 to a 2:1 F_2 ratio when zl is linked with a dominant gene or a 3:1 to a 1:0 F_2 ratio when linked with a recessive gene. The nature of the characters studied made impossible the use of ordinary methods of determining the linear order of the genes. The method used was based on the assumption that few or no double crossovers occurred in so short a region. The orientation of this group of gene with reference to other genes of the first chromosome was accomplished by the use of certain reciprocal translocations whose chromosome breaks were near the P locus. The order of the genes and the recombination % between them was found to be:

$sr \leftarrow ms_{17} \ 1.7 \ ts_2 \ 1.3 \ P \ 1.5 \ zl \rightarrow br.$

—R. A. Emerson.

8933. GOODSPEED, T. H., and FRED M. UBER. Radiation and plant cytogenetics. *Bot. Rev.* 5(1): 1-48. 1939.—Discussion of the physical nature and biological effects of radiation—x-rays (physical effects, wave-length, quantitative relationships, the quantum hit theory, and variation of cytologically effective dosages) and particle and ultra-violet radiation. The literature on non-heritable, cytoplasmic, and nuclear alterations and of cytogenetic consequences of chromosomal alterations is reviewed (326 references)—L. Benson.

8934. GRAVES, ARTHUR HARMOUNT. Breeding trees for disease resistance. *Eastern Shade Tree Conference, Proceedings* Dec. 8, 9. 1938. p.95-99. 1939.—There are 4 indica-

tions that the London plane, *Platanus acerifolia* is a hybrid of *P. orientalis* and *P. occidentalis*: Character variation in seedlings, some resembling the oriental, others the occidental parent, and still others the hybrid itself; the remarkable adaptability of the tree; it has never been found in the wild state; and in the tree itself, some characters are like those of one parent and others like the other parent. The only other explanation is that it is a variant of one of the above-named species. This hitherto highly resistant tree is reported to have been attacked in some sections, by a species of *Ceratostomella*. The Japanese-American hybrid chestnut shows remarkable vigor, but even the best individuals are not as resistant to chestnut blight as the Japanese parent. When the hybrid is crossed with Chinese chestnuts, (entirely resistant), the offspring may prove to be a strongly resistant tree.—The elm Christine Buisman (Clon No. 24) is the one individual found resistant to the Dutch elm disease in Holland among 500-600 elms (presumably *Ulmus campestris*) brought from Spain in 1929. Among introduced species, the greatest resistance is found in the Siberian elm, *Ulmus pumila*. This species crossed, with the American elm, might produce a tree with the large and beautiful vase-like outline of the American species, and at the same time be resistant to the Dutch elm disease.—*R. Silverman*.

8935. JONES, D. F. Nuclear control of cell activity. *Science* 88(2287): 400, 401. 1938.—The author presents pertinent data on nuclear control, with special reference to single cell mosaics exhibiting changes in color, starch formation, and size and shape of cells in maize seeds. Certain external agents also can initiate changes in cell activity. They are either similar in action to substances originating in the nucleus or they act on the nuclear material in such a way as to induce the production of more or less of the same substances. It is believed that the effect of these external agents is an indirect one, first altering the nuclear constituents, and these in turn having their effect in the usual way.—*Courtesy Exp. Sta. Rec.*

8936. KRANTZ, F. A., CATHARINE L. BECKER, and Z. M. PINEMAN. Incidence and inheritance of pollen sterility in the potato. *Jour. Agric. Res.* 58(8): 593-601. 1939.—Of 2,786 individuals derived from 101 selfed lines of the potato, 47.8% flowered and 60.9% of the flowering individuals set fruit. A study of 69 F_1 to F_4 families of a cross indicated that 94.7% of the population had a sufficient amount of viable pollen for setting fruit naturally. The inheritance of pollen sterility was studied by using an acetocarmine stain to differentiate between viable and non-viable pollen, and classifying the individuals on the basis of a progeny test. The segregation obtained could be explained by assuming the presence of a tetrasomic gene, which, when present in the pollen in the homozygous condition, is lethal and in the heterozygous condition partly lethal.—*Authors*.

8937. LANTELME, W. Phototropismus und Provenienz. *Allg. Forst- u. Jagd-Ztg.* 115(3): 69-85. 1939.—The author cautions against the use of the phototropic method of testing seed, advocated by W. Schmidt, for selecting tree seed of good parentage. Phototropism is independent of provenience and is not a dominant characteristic. The "plasm" theory as an explanation of the inheritability of adaptations is outlined.—*W. N. Sparhawk*.

8938. LEPPER, ROBERT Jr., and T. E. ODLAND. Inheritance of flower color in alfalfa. *Jour. Amer. Soc. Agron.* 31(3): 209-216. 2 fig. 1939.—In studies on winter hardiness and other economic characters in alfalfa (*Medicago* sp.) at the Rhode Island Agric. Expt. Station, information was also obtained on the inheritance of flower color. The blue and white flowered strains were of the *sativa* group; the yellow were of *M. falcata*. Selfing generally caused a reduction in vigor but there were some outstanding exceptions. A decided hybrid vigor was evident in the progeny from some crosses, in others this was not evident. It was difficult to make clear cut distinctions between various colors and shades of color and for classification they were arranged in 8 groups ranging from dark purple to white. In all, 11 crosses were made in which flower color inheritance was studied in the F_1 , F_2 , and F_3 generations. In the purple by white crosses all F_1 plants had purple flowers. In the F_2 population there was a total of 411 purple to 29 white.

This is close to a 15:1 ratio, indicating a 2-factor pair difference. All white flowered F_2 plants tested bred true for this color, a recessive. Some of the F_3 progenies from the purple flowered F_2 plants bred true for this color and some showed segregation. Only one purple \times yellow cross was obtained. The F_1 plants had light purple flowers. In the F_2 there were 38 purple, 10 yellow and 1 white flowered plant. The white flowered plant bred true in the F_3 , as did also 2 F_3 progenies from purple F_2 plants. All yellow flowered F_2 plants were sterile. A 3-factor pair difference is used to explain the inheritance of flower color in this cross. In a cross between a white flowered and a yellow flowered plant the F_1 had purple flowers. In the F_2 there were 23 purple, 15 white, and 3 yellow flowered plants. So far, there are no F_3 progenies. A 3-factor pair difference is suggested in this cross, also. A cross between a purple flowered selfed line from the variegated Cossack alfalfa and a white flowered plant resulted in an F_1 with variegated greenish-purple flowers. An F_2 population of 273 plants had flowers ranging in color from dark purple through green and yellow to white. A number of F_3 progenies were grown. In this cross at least 4 factors for flower color seem to be involved.—2 basic supplementary factors are apparently present for the production of color in the flowers. The absence of these 2 factors results in white. Purple appears epistatic to yellow. Letting P represent the factor for purple, Y for yellow, while C and A are basic factors for the production of color, the following genetic make-up of the different types is suggested: purple, $PPCCAAYy$; yellow, $ppCCaaYY$; and white, $PPccaayy$. On this basis a 15:1 ratio of purple to white would be obtained in purple by white crosses; a 12:3:1 purple-yellow-white ratio in purple by yellow crosses; and a 36:9:19 purple-yellow-white ratio in yellow by white crosses.—*R. Lepper, Jr.*

8939. LESLEY, J. W., and MARGARET LESLEY. Unfruitfulness in the tomato caused by male sterility. *Jour. Agric. Res.* 58(8): 621-630. 2 fig. 1939.—In an F_2 from triploid \times diploid tomatoes simple trisomic (triplo-H), fruitful diploid, and healthy, but almost unfruitful diploid plants occurred. Pollen from mature flowers of fruitful plants in iodine-KI consists largely of clear pale yellow grains but that of unfruitfuls is smaller, more alveolar, and usually contains many starch grains; the few normal looking grains apparently do not function. The number of empty grains due to early pollen abortion, which is greatly increased by disease and by very hot weather, is greater in unfruitfuls. The unfruitfulness is due to σ sterility. F_2 and backcross data indicate that this character depends on at least 2 recessive genes ms_1 and ms_2 and that σ sterile plants are $ms_1 ms_1 ms_2 ms_2$. One fruitful unrelated σ fertile plant was apparently $MS_1 ms_1 MS_2 ms_2$. The presence of such a genotype in a variety may account for the occasional occurrence of unfruitful plants observed in certain cultivated tomatoes.—*Authors*.

8940. ROBERTSON, D. W. Genetics of barley. *Jour. Amer. Soc. Agron.* 31(4): 273-283. 3 fig. 1939.—A brief review of the linkage studies in barley is given. Maps of the various linkage groups and a brief discussion of the various factor pairs located in the different groups are presented.—*D. W. Robertson*.

8941. RUTTLE, M. L., and B. R. NEBEL. Cytogenetic results with colchicine. *Biol. Zentralbl.* 59(1/2): 79-87. 3 fig. 1939.—An account of polyploids induced by colchicine in marigolds, snapdragons and mint hybrids, with briefer mention of similar results in *Tradescantia*, petunias, phlox and *Crepis*. The tetraploids may be of value as new horticultural vars. and as parents for making crosses which may yield new desirable vars. Tetraploidy, readily induced by colchicine, is a method of fixing desirable types in heterozygous material and in sterile hybrids.—*A. H. Hersh*.

8942. SENGBUSCH, R. v., and H. KRESS. Über das Auftreten zweier rezessiver Mutationen bei *Lupinus albus* in bestimmter Reihenfolge. *Biol. Zentralbl.* 59(3/4): 222-224. 1939.—In the white lupine dark is dominant to light seed color and the presence of alkaloid is dominant to its absence. The traits are linked with 2% crossing over. Light colored seed was present in from 0.1 to 1% of the populations raised from material of diverse geographic origin. The alkaloid-free condition was found in from 0.03 to 1% of the light seed material from these same populations. The mutation for

absence of alkaloid apparently does not occur in dark seed plants, indicating a sequence in the mutation process; first from dark to light seed, then from the presence to the absence of alkaloid.—A. H. Hersh.

8943. SPRAGUE, G. F. Heritable characters in maize. 50-vestigial glume. *Jour. Heredity* 30(4): 143-145. 3 fig. 1939.—The gene *Vg* is dominant to normal and conditions a partial suppression of glumes in both tassel and ear. This gene is in the first linkage group, the linear order being *j-vg-br-bm*.—G. F. Sprague.

8944. STEIN, EMMY. Über einige Pfropfversuche mit erblichen, durch Radium-Bestrahlung erzeugten Varianten von *Antirrhinum majus*, *Antirrhinum siculum* und *Solanum lycopersicum* (Tomate König Humbert.) *Biol. Zentralbl.* 59(1/2): 59-78. 13 fig. 1939.—Intracellular gene effects are demonstrated in *A. majus* by transplants between the normal and a defective mutant (changed cell structure) which develop according to their own genetic constitution similar to chimeras. Gene conditioned effects produced by transport of effective substances are demonstrated in *A. siculum* and in the tomato. The mutant *nana* in the tomato is characterized by scanty chlorophyll, dwarf growth and absence of side shoots and inflorescence. After grafting upon a normal stock, the *nana* scion shows no change in regard to chlorophyll, but growth is approx. normal in height and side shoots; inflorescence develops with normal form, size and color of the single blossoms, which set fruit when normal pollen is used but not when selfed. In *A. siculum* the normal form is small-leaved, many-branched and bushy with numerous blossoms. The mutant *sterilis* has a single unbranched whip-like main stalk often 1 m. long without blossoms, but with leaves larger, thicker and darker than normal. A *sterilis* scion upon a normal stock is not changed in regard to side branches but the main stalk makes a bend at the tip where abnormal flowers are produced, indicating the transport of an organ-forming substance supplied to the *sterilis* scion by the normal stock.—A. H. Hersh.

ANIMAL (EXCEPT MAN)

8945. BOURNE, M. H., and H. GRUNEBERG. Degeneration of the retina and cataract. *Jour. Heredity* 30(4): 131-136. Frontispiece, 3 fig. 1939.—A new recessive gene in *Rattus norvegicus* is described which causes a degeneration of the retina, beginning at 3 wks. Later in life many of the animals develop changes in the lens which may lead to mature cataract. Persistent hyaloid artery occurs fairly frequently in the stock. The development of cataract depends in some way on the degeneration of the retina which always precedes it in time; the retinal changes correspond closely to retinitis pigmentosa in man. Primary gene effects (retina) show a straightforward mode of inheritance; secondary effects (lens) may exhibit irregularities of manifestation.—Authors.

8946. CLARK, FRANK H. Inheritance and linkage relations of mutant characters in the deer mouse, *Peromyscus maniculatus*. *Contr. Lab. Vert. Genetics Univ. Michigan* 7. 1-11. 1938.—Descriptions are given of all the known mutant characters of the deer mouse including: buff vs. gray, albinism, pink-eye, ivory, yellow, brown, silver agouti, dilute, hairless, postjuvenile nude, grizzled, white spotting, waltzing, epilepsy, inherited tremor, and flexed tail. Linkage tests present further evidence for a high degree of linkage between pink-eye (formerly called pallid) and albinism, and suggest that crossing over may be less in F_1 ♂♂ than in F_1 ♀♀. The following tests reveal no linkages: yellow vs. albinism, yellow vs. dilute, yellow vs. hairless, and yellow vs. buff. Buff and gray behave as allelomorphs in intersub-specific crosses.—F. H. Clark.

8947. DANFORTH, C. H. Direct control of avian color pattern by the pigmentoblasts. *Jour. Heredity* 30(4): 173-176. 1 fig. 1939.—Expts. extending over a number of yrs. indicate that for several days after hatching pigmentoblasts continue to migrate into developing feather follicles, where they form centers which contribute to successive new feathers as they are formed. In graft hybrids the behavior of genetically different pigmentoblasts can be studied in the same feather. An analysis of pigmentation in such mosaics leads to the conclusion that pigmentoblasts not only produce the color but also through some power of mutual orientation determine their own characteristic patterns.—C. H. Danforth.

8948. DOBZHANSKY, TH. Genetics of natural populations. IV. Mexican and Guatemalan populations of *Drosophila pseudoobscura*. *Genetics* 24(3): 391-412. 3 fig. 1939.—Samples of natural populations of *D. pseudoobscura* were collected in localities in Mexico and Guatemala, where this sp. occurs in mountains and avoids the low tropical zone. A cytogenetic study showed these populations to be equally or more variable than those coming from the temperate parts of N. Amer. In the 3d chromosome 9 structural types, related to each other as overlapping inversions, were found, one of the types being new: among the other 8, some are endemic to Mexico and Guatemala, while others occur also in the U. S., chiefly in the South. In general, taken by and large, populations from remote localities are usually less alike than those from more nearly adjacent ones. Microgeographic variations, however, cause neighboring populations to be sometimes rather dissimilar. The macro- and micro-geographic variations coexist side by side without being mutually exclusive. The shape of the Y-chromosome is also variable, 2 types being found in Mexico and a 3d in Guatemala. The "sex-ratio" factors, associated with triple inversions in the X-chromosome, are also encountered in Mexico, but rarely in Guatemala. A genetic analysis of the 3d chromosomes has shown that about 30% of these chromosomes in the populations inhabiting Mexico and Guatemala carry lethals or semi-lethals. This figure is significantly higher than that found previously for the wild populations of the same sp. from the mts. of the Death Valley region, California. This difference between the Mexican and Guatemalan populations and those from the Death Valley region possibly reflects the difference in the effective size of the breeding populations in the 2 areas. Besides lethals, deleterious viability modifiers, modifiers of the development rate, visible mutations and probably other genetic changes are frequently encountered.—T. Dobzhansky.

8949. ELY, FORDYCE, F. E. HULL, and H. B. MORRISON. Agnathia, a new bovine lethal. *Jour. Heredity* 30(3): 104-108. 1 fig. 1939.—Within a period of 18 months 3 cases of agnathia (absence or imperfect development of the lower jaw) have appeared in the Kentucky Agric. Expt. Station herd of registered Jerseys. All were ♂♂ and sired by one sire and closely related dams. Another case appeared simultaneously in another herd of very similar breeding. In the first 3 cases mentioned a wattle-like appendage accompanied the defect. The agnathia character is inherited, apparently, as a sex-limited recessive lethal.—Authors.

8950. GREENSHIELDS, F. Whiting's hypothesis and Pteromalus: a critique of Dozorova's (1936) study. *Amer. Nat.* 73(744): 89-91. 1939.—Whiting (1933) postulated for *Habrobracon* that ♀♀ are XY, diploid ♂♂ XX and YY, haploid ♂♂ X and Y. Diploid ♂♂ are less frequent than ♀♀ because less viable and because in outcrosses selective syngamy takes place, the sperm nucleus uniting with the egg nucleus with unlike sex chromosome. The author assumes this to mean that half of the eggs are unfertilizable by sperm from any one ♂. On this basis data of Dozorova (1936) on sex-linked trait, red eyes, in *P. puparum* are inconsistent with Whiting's theory.—P. W. Whiting.

8951. GRUNEBERG, HANS. Fertility in cross-bred mice. *Jour. Heredity* 30(3): 83-84. 1 fig. 1939.—A record litter of 19 mice, photographed natural size, is shown. Statistical data are given which indicate a very high degree of fertility in fancier's stock. One pair produced a litter of 17 of which 11 were reared. Heterosis is suggested as a possible explanation of the unusual fertility exhibited.—L. M. Dickerson.

8952. HAGEDOORN, V., V. LABRAND, and A. L. HAGEDOORN. Mouse-breeding made easy. *Jour. Heredity* 30(4): 147-148. 1 fig. 1939.—A very simple and inexpensive system of handling breeding colonies of mice is descr. Enamelware pans with hardware cloth covers are used as cages. Larger pans—14 inches in diam.—are used as rat cages. The mice are fed on a ration of equal parts of wheat and a good quality of commercial poultry laying mash containing cod liver oil. Approx. 10% of dried skim milk is added and enough water, to which fresh yeast has been added, to make the mass wet. The food is kept in a warm room over night before feeding.—L. M. Dickerson.

8953. IVES, PHILIP TRUMAN. The effects of high temperature on bristle frequencies in scute and wild-type

males of *Drosophila melanogaster*. *Genetics* 24(3): 315-331. 1939.—Two races of sc-1 ♂♂ and a race of related wild-type ♂♂ were exposed to 40° and 36°C for graded periods during the egg, larval, and early pupal periods, and were classified for sc-affected bristles. At both temps. temp.-effective periods were found which extended throughout the tested periods. In sc ♂♂ the most extensive effect was on the ocellar bristles at 40° and on the scutellar bristles at 36°; but all tested bristles were affected at some period in both races. In wild-type ♂♂ the effect of 36° was mainly on the scutellars and in a direction roughly reciprocal to that in sc ♂♂. The effect of temp. on sc ♂♂ depended upon the temp. used, the developmental period tested, the genetic modifiers present, and the bristles considered. The results were compared with those of Child and were interpreted as indicating the probability that in sc ♂♂ different developmental reactions were affected by viable temps., 36°, and 40°C. The data supported Child's finding of no pattern or gradient relationship in sc-affected bristles, and were interpretable on Plunkett's rate theory.—P. T. Ives.

8954. KUSHNER, H. F. The blood composition in yaks, in cattle, and in their hybrids in connection with the heterosis of the hybrids. *Compt. Rend. (Doklady) Acad. Sci. URSS, Nouv. Sér.* 19(3): 185-188. 1938.—Blood analyses of yaks, cattle, and hybrids between them in the Oirat Zootechnical Station showed that the Hb content, blood alkalinity, and diam. of the red cells increased, the number of red cells decreased, with age. Comparisons of the adult yak and cattle with hybrids showed that the hybrids greatly exceeded the 2 parental spp. in the basic indexes responsible for the oxidizing power, such as Hb content, number of erythrocytes, and alkalinity. The better oxidizing capacity of the blood causes a more intense metabolism and more rapid growth. Similar results were obtained in studies, noted above, of hybrids of dromedaries and Bactrians and in mules.—*Courtesy Exp. Sta. Rec.*

8955. LAMOREUX, W. F. A pseudogynandromorph in the fowl. *Jour. Heredity* 30(3): 78-80. 2 fig. 1939.—Description and illustrations refer to 2 pseudogynandromorphs developed experimentally to demonstrate within a single bird the relationship between the ♀ sex hormone and the color and structure of plumage. Mature ♂ F₁ progeny of a Barred Plymouth Rock ♂ and a Silver Spangled Hamburg ♀ were used. After plucking all feathers except the remiges from the right side of the bodies injections of Progynon B were given twice daily over a period of 60 days. The new feathers, grown under the influence of ♀ sex hormone, were of ♀ structure and barred throughout; the hackle, saddle and wing feathers had been irregularly white and spangled prior to plucking. The resulting pseudogynandromorphs bear normal ♂ plumage on the left, thus effectively illustrating the influence of ♀ sex hormone upon both the color and structure of feathers which have the same genetic constitution.—L. M. Dickerson.

8956. LUSH, JAY L., and A. L. ANDERSON. A genetic history of the Poland-China breed of swine. *Jour. Heredity* 30(4): 149-156. 5 fig. 1939.—The sampling method of Wright and McPhee was used to study the pedigree structure of this American breed of swine at 4 dates; 1900, 1910, 1920 and 1929. The inbreeding was sufficient to cause by 1929 a loss of nearly 10% of the heterozygosis which was present in the foundation stock in 1885. This is a loss of about 0.6% of the existing heterozygosis per generation. There was only a faint tendency for distinct families to be formed and kept from inter-crossing with each other. A large fraction of the genes of the breed came from a small number of foundation animals, thus affording opportunity for gene frequency to drift considerably by chance. Nearly half of the genes of the breed in 1920 and in 1929 came from 10 foundation animals. The average interval from one generation to the next was about 2½ yrs.—J. L. Lush.

8957. RUSSELL, ELIZABETH S. A quantitative study of genic effects on guinea-pig coat colors. *Genetics* 24(3): 332-355. 1939.—To study the action of guinea-pig coat color factors, detns. were made of the amt. of pigment in the hair of various genotypes. The relative concns. in yellow types were detd. by colorimetric comparisons of alkaline soles. Sepia pigments were isolated by the Einsele technique and measured by weighing or oxidizing with KMnO₄. In

sepias, pale sepias, and yellows, the homozygotes of the lower active alleles produce approximately twice as much pigment as their heterozygotes with the inactive gene or genes, while the highest allele appears to be completely dominant, suggesting that in some reaction between gene and character the gene product is in defect in relation to its substrate with the lower alleles and in excess with the highest member of the albino series.—E. S. Russell.

8958. STRONG, LEONELL C. A differential effect of methyl salicylate on the growth of spontaneous tumors in two strains of inbred mice. *Jour. Heredity* 30(3): 85-86. 1939.—Methyl salicylate administered in their diets has a pronounced effect on the growth rate of spontaneous tumors in ♀ mice of the strong CBA strain. It has no inhibitory action on the growth rate of spontaneous tumors in ♀ mice of the strong A strain. Spontaneous tumors, in mice at least, may eventually be controlled by chemotherapy.—L. C. Strong.

MAN

8959. CORRELL, HELEN BUTTS. The birth rate for Wellesley College graduates. *Jour. Heredity* 30(4): 137-138. 1939.—The study was based upon 6,257 replies to a questionnaire sent to Wellesley College alumnae. The % of alumnae married including graduates from '79 through '34 was 63.7%. In 1935, 78% of the graduates out of college from 12 to 16 yrs. had married. The number of children per wife was 1.66. When only those graduates old enough to have completed their families (classes '79-'13) were included the number of children per wife was 2.03. The number of children per mother was 2.13. 22.3% of all marriages were childless. Only 2.1% of all alumnae married were divorced.—H. B. Correll.

8960. GENNA, G. E. Contributo allo studio delle ereditarietà dei gruppi sanguigni. [Blood group heredity.] *Arch. Sci. Biol. [Naples]* 24: 375-395. 1939.—Statistical study of isohemagglutinin blood groups in 37 families comprising 241 individuals in upper Italy, bears out inheritance according to Mendelian laws and the Bernstein theory of triple allelomorphism.—H. Sobotka.

8961. MYRDAL, ALVA. The Swedish approach to population policies. Balancing quantitative and qualitative population philosophies in a democracy. *Jour. Heredity* 30(3): 111-115. 1939.—A digest of the program of socioeconomic reform now under way in Sweden is presented. The program has the planned objective of stimulating population growth through sound eugenic measures. It includes plans for better housing conditions as families increase in size and medical, financial and educational aids to children and pregnant mothers. Both voluntary and compulsory sterilization are provided for but no attempt is made to apply them to broad classes among the people.—L. M. Dickerson.

8962. NOTESTEIN, FRANK W. Some implications of current demographic trends for birth control and eugenics. *Jour. Heredity* 30(3): 121-126. 1939.—This is a critical review of population trends in the world in general and the U. S. A. in particular since the 17th century. The results of shifting fertility differentials, changes in class differences, age composition and effects of the birth control movement are discussed. Commercial influences are considered more important than clinics and other educational organizations in the widening use of contraceptives. The need for better positive eugenic programs to offset the danger of ill advised panic legislation is emphasized.—L. M. Dickerson.

8963. RAVIN, ABE, and JAMES J. WARING. Studies in dystrophia myotonica. I. Hereditary aspects. *Amer. Jour. Med. Sci.* 197(5): 593-609. 1 fig. 1939.—Four family trees, in which dystrophia myotonica occurs, are presented; 12 cases were found among 33 members examined. Reports in the literature of direct transmission of dystrophia myotonica from parent to child show that the onset of the disease in the children is at an earlier age than in the parents. Dystrophia myotonica is evidently transmitted as a single dominant factor, dominance being modified by the occurrence of "progressive inheritance"—i.e., the onset of the disease is at an earlier age in each succeeding generation (anticipation) and the disease increases in severity in succeeding generations (potentiation). Because of the

presence of progressive inheritance, (1) the parents of many patients may show little or no signs of the disease and (2) the children of patients develop the disease so early that further propagation is prevented and the disease dies out in the family. An explanation of progressive inheritance is offered: From Goldschmidt's investigations (Quarterly Rev. Biol., 1928) the author assumes that alleles differ in degree of activity rather than in kind of activity, and that gene mutation represents a change to a new level of activity at which the gene usually remains; but in degenerative diseases displaying progressive inheritance, the changes in activity of the gene are not stable, loss of activity progressing over a considerable period.—*A. Ravin.*

8964. SOUTHWICK, WALTER E. Sex ratios and twin producing kindreds. *Amer. Nat.* 73(744): 44-68. 1939.—919 twins in 85 kindreds filed in the "A" File of the Eugenics Record Office, Carnegie Institution of Washington, were analyzed, and the occurrence of an association between the factors for the production of identical and those for the production of fraternal twinning was demonstrated. The occurrence of the condition was shown both by means of the "difference method" of analysis for the ratios of like and unlike sexed twins that occurred in the same kindred, and by means of a detailed study of the occurrences of specifically described identical twins in kindreds which also contained specifically described like sexed fraternal or unlike sexed twins. The association occurs widely and in a significantly large majority of the kindreds, irrespective of their size. Identical twins occur in such kindreds, much more frequently than they do in any of the other kindreds.

The possible genetic bases for this condition are discussed.—*W. E. Southwick.*

8965. STILES, KARL A. The inheritance of brachymetapody. *Jour. Heredity* 30(3): 87-91. 1 fig. 1939.—Brachymetapody in man is a condition in which certain digits of the hand or foot are abnormally short, due to the relative shortness of either the metacarpals or metatarsals. This rare trait has been reported as a dominant, but study of a family where genetical analysis of this trait was more complete than usual gives strong evidence that it is not regularly dominant. While brachymetapody appeared in individuals who were heterozygous for the character, others who were doubtless carriers of the defective gene, did not show the trait, which, then, behaves as an irregular dominant.—*K. A. Stiles.*

8966. SUNDFÖR, HANS. A pedigree of skin-spotting in man. 42 piebalds in a Norwegian family. *Jour. Heredity* 30(3): 67-77. Frontispiece, 5 fig. 1939.—The pigment anomaly was inherited as a dominant trait through 4 generations. Among the offspring of heterozygous piebalds, 41 were piebald and 30 normal. The totally unpigmented areas comprise a frontal blaze, in one case including the eyebrows, a large area on the ventral side of the thorax and abdomen as well as spots on the limbs. The contrast between the unpigmented spots and the surrounding normal skin becomes striking when the skin has been exposed to sunlight. The dorsal side of the body has normal pigmentation. The hair and eye color in the piebald does not differ from that found in the normal family members. Related cases from the literature are reviewed.—*O. L. Mohr.*

BIOMETRY

JOHN W. GOWEN, *Editor*

(See also in this issue Entries 8891, 9214, 9757, 10008, 10190, 10203)

8967. BEALL, GEOFFREY. Methods of estimating the population of insects in a field. *Biometrika* 30(3/4): 422-439. 3 fig. 1938(1939).—Various methods which might have been employed to estimate the numbers of adults of the Colorado potato beetle, *Leptinotarsa decemlineata*, were tested from a complete count over a field. Small sampling-units were found to be best although a narrow type running across several rows of potatoes was almost as good. A marked reduction in the area which would have to have been examined to secure a given degree of accuracy in the estimate of population could have been obtained by dividing the field into subdivisions to be independently sampled. If a total sample of at least 25% of the whole area were to have been examined, the estimate could have been further improved by making the number of sampling-units examined in each subdivision proportional to the standard deviation, as estimated from a preliminary survey, for the sampling-units within a subdivision.—*G. Beall.*

8968. FISHER, R. A., and F. YATES. Statistical tables for biological, agricultural and medical research. viii + 90p. Oliver and Boyd: Edinburgh, 1938. Pr. 12s 6d.—This volume of tabled functions, as with the earlier "Tables for Statisticians and Biometricians" by Pearson, is intended to facilitate the interpretation of the numerical data of experiment. 34 tables are included. The first 7 are taken from "Statistical Methods for Research Workers." They give an arrangement for the normal curve; the ordinates of this curve; the t , χ^2 and z distribution; significance levels of r and transformations of r to z . The 8th table gives data on the significance of the 2×2 contingency table. Tables 9, 10 and 11 present Bliss's probit material. Tables 12, 13 and 14 deal with angular transformations. Tables 15 to 19 include Latin square, incomplete block designs, etc. A transformation of ordered data—like scores on tests—into deviates on the normal scale is presented in table 20 for deviates and 21 for sums of the squares of these deviates. Table 22 gives numerical assistance to problems in combination. Tabled functions to facilitate fitting of orthogonal polynomials are presented in table 23. Data for the calculation of integrals from equally spaced ordinates are included in table 24. Short tables of functions, carried to 5 places, frequently used in statistical analysis are presented in table 25 et seq. They

include common and natural logarithms, squares and square roots, reciprocals, factorials and their logarithms of numbers from 1 to 300, Natural sines, tangents, Random number, common, physical, chemical and mathematical constants. Numerical data, illustrative of the particular tabled material, are discussed in an introduction to the tables.—*J. W. Gowen.*

8969. KENDALL, M. G., SHEILA F. H. KENDALL, and B. BABINGTON SMITH. The distribution of Spearman's coefficient of rank correlation in a universe in which all rankings occur an equal number of times. *Biometrika* 30(3/4): 251-273. 2 fig. 1938(1939).—An expression is derived for the distribution of Spearman's coefficient of rank correlation, ρ in the universe obtained by correlating a given ranking of n with all possible rankings of n . The distribution, which presents some unusual features, is given explicitly up to and including $n=8$. Approximations for higher values are examined and it is concluded that ρ may be tested in "Student's" distribution with $n-2$ degrees of freedom by putting $t = \rho\sqrt{(n-2)/\sqrt{1-\rho^2}}$. Exptl. data for $n=10$ and $n=20$ are given and interpreted as supporting the theory. A comparison is made between the Spearman coefficient and another coefficient suggested by Kendall [see B. A. 13(2): entry 1812].—*M. G. Kendall.*

8970. LAWLEY, D. N. A correction to "A generalization of Fisher's z test." *Biometrika* 30(3/4): 467-469. 1938(1939).—An error in a previous paper is corrected and it is shown that the distribution of z obtained there holds only approximately.—*D. N. Lawley.*

8971. LEDERMANN, WALTER. Sampling distribution and selection in a normal population. *Biometrika* 30(3/4): 295-304. 1938(1939).—Explicit proof of a theorem first enunciated by Godfrey H. Thomson, namely that for a normal population K. Pearson's general problem of selection may be looked upon as the limiting case of a regression problem (i.e., finding the mean values of certain frequency arrays) with respect to the population of correlation matrices calculated from all possible samples of N individuals. As N tends to infinity, K. Pearson's results (in the concise matrix form recently given by A. C. Aitken) are obtained from the regression formulae.—*W. Ledermann.*

8972. NAIR, U. S. The application of the moment func-

tion in the study of distribution laws in statistics. *Biometrika* 30(3/4): 274-294. 1938(1939).—The object of the paper is to study certain types of distribution laws in statistics based on Mellin's Inversion formula viz., if

$$\phi(t) = \int_a^b x^t \rho(x) dx, \quad \rho(x) = \frac{1}{2\pi i} \int_{-i\infty}^{i\infty} x^{-t-1} \phi(t) dt$$

provided the integrals are convergent. Some extensions of the formula in the case of 2 or more variables are proved in section 1 of the paper and the rest of the paper is devoted to applications of the principles enunciated. The illustrations taken are the sampling distributions of:—1). Neyman-Pearson L_1 criterion; 2). Certain criteria discussed by S. S. Wilks in "Certain Generalisations in the Analysis of Variance." *Biom.* 24. (3 & 4) Nov. 1932. Most of the distribution laws obtained are in the form of series for which no simple mathematical functions exist.—*U. S. Nair.*

8973. PEARSON, E. S. Note on Professor Pitman's contribution to the theory of estimation. *Biometrika* 30(3/4): 471-474. 1938(1939).—This note discusses the relation between E. J. G. Pitman's approach to the problem of fiducial estimation (see following abstract) and J. Neyman's theory of confidence intervals.—*E. S. Pearson.*

8974. PITMAN, E. J. G. The estimation of the location and scale parameters of a continuous population of any given form. *Biometrika* 30(3/4): 391-421. 1938(1939).—The main problem considered is the location and scaling of the distribution of a continuous chance variable X . We suppose that the elementary probability function of X is

$$\frac{1}{c} f\left\{\frac{x-a}{c}\right\}, \quad c > 0,$$

where the function $f(x)$ is known but one or both of the parameters a, c , which determine respectively the location and the scale of the distribution, is unknown. We have a sample of n independently observed values of X , and from these we have to estimate the unknown parameter or parameters. Any function of the sample values whose value may be used as an estimate of an unknown parameter is called an estimator of that parameter. The paper shows how to determine an estimator with any required property, such as minimum mean absolute error or minimum mean square error. In particular, the closest estimator is determined;

this is an estimator whose median value is the true value of the parameter and which is likely to be closer to the true value than any other estimator. It is shown that in certain cases what may be reasonably called a "best" estimator exists. Fiducial limits for the unknown parameter are determined, and the fiducial distribution of the parameter is defined. It is shown that problems of estimation can be dealt with very simply, and completely, by means of fiducial distributions. For a population of given form, the fiducial distribution of a when both a and c are unknown, provides a test which corresponds to "Student's" test for significance of the mean of sample from a normal population. The estimation of the difference between the location parameters of two populations of similar forms is discussed.—*E. J. G. Pitman.*

8975. YATES, F. The comparative advantages of systematic and randomized arrangements in the design of agricultural and biological experiments. *Biometrika* 30(3/4): 440-466. 9 fig. 1938(1939).—The recent claims advanced in favor of systematic arrangements by Gosset ("Student") and others are examined. The conclusion is reached that in cases where Latin square designs can be used, and in many cases where randomized blocks have to be employed, the gain in accuracy with systematic arrangements is not likely to be sufficiently great to outweigh the disadvantages to which systematic designs are subject. In particular the available evidence, though not conclusive, indicates that the half-drill strip arrangement, which Gosset particularly favored, is likely to be somewhat less accurate than suitable random arrangements occupying the same plots. On the other hand, systematic arrangements may in certain cases give decidedly greater accuracy than randomized blocks, but it appears that in such cases the use of the modern devices of confounding, quasi-factorial designs, or split-plot Latin squares is likely to give a similar gain in accuracy, and is much more satisfactory statistically. As an example the uniformity trial chosen by Barbaek and Fisher to demonstrate the defects of the half-drill strip arrangement is re-examined. Gosset's criticisms of Barbaek & Fisher's work, though at first sight convincing, are not as conclusive as he supposed, and this particular trial provides a striking example of just those defects which have always been attributed to the half-drill strip methods by its critics.—*F. Yates.*

ECOLOGY

Editors

W. C. ALLEE, *General Animal Ecology*
G. D. FULLER, *General Plant Ecology*
CHANCEY JUDAY, *Hydrobiology (Oceanography, Limnology)*

FREDERICK A. DAVIDSON, *Ecology of Wildlife Management—Aquatic*
W. L. MCATEE, *Ecology of Wildlife Management—Terrestrial*

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Communities—ants and men, 8871; Animal behavior, 8883; Dictionary, 8896; Evolution of parasitic habit, 8899; Genetics of wild *Drosophila* populations, 8948; Disease and environment, 10008; Entomophily in *Osmanthus*, 10144; Wireworm population studies, 10410; Population density and reproductive rate in *Paramecium*, 10519; Rhizopods of Lapland, 10526; Adaptations in muscles, 10560; Zoogeography of Ostracod, 10569; Life cycles of carabid beetles, 10593; Adaptation in leaf-cutting beetle, 10594; Flower-eating birds, 10649; Mammals of Idaho, 10659; Ecology of body color in deer-mice, 10664. [PLANT ECOLOGY]: Agropyron, 10122; Geographic factors in plant speciation, 10158; Life zones of Greenland, 10162; Pollination in *Vallisneria*, 10168; Role of root reserves in persistence of perennial weeds, 10176; Competition for soil water—maize vs. *Convolvulus*, 10177; Selenium indicator plants and seleniferous areas of U. S., 10179; Factors affecting prevalence of *Trifolium repens*, 10180; Grassland agriculture, 10181; Grazing and pasture management in Kenya, 10189; Grasses susceptible to grasshopper attack, 10191; Temp. and humidity as affecting seed viability, *Festuca*, 10193; Soil conservation and crop rotation, Washington (State), 10199; Wild erosion in field and soil drift expts., 10204; Forest sites, Bioclimatics, 10238; Pine and Spruce, 10243; Afforestation on water-washed soils, 10245; Reforestations and succession in Brazil, 10246; Root competition, 10257; Root competition and silviculture, 10278; Damping-off disease as edaphic limiting factor for pines, 10352)

GENERAL

8976. ALLEE, W. C. *The social life of animals.* 293p. W. W. Norton: New York, 1938. Pr. \$3.00. 265p. Heinemann: London, 1938. Pr. 12s. 6d.—This book presents in non-technical language the general framework of group biology with reference to the beginnings of social life. It might more appropriately have been called the biological background of cooperation. In a general way the literature dealing with animal aggregations is brought up to date. Attention is paid to the rôle of numbers of organisms in various aspects of population physiology including social facilitation, group organization and even general evolution. Indications are given of the relations between laboratory and natural populations and between aggregations and truly social life. A chapter on human implications is an integral part of the discussion. There is a brief bibliography and an index.—*W. C. Allee.*

8977. SCHNEIDER, F. *Ein Vergleich von Urwald und Monokultur in Bezug auf ihre Gefährdung durch phytophage Insekten, auf Grund einiger Beobachtungen an der Ostküste von Sumatra.* *Schweiz. Zeitschr. Forstwesen* 90(2): 41-55; (3): 82-89. 11 fig. 1939.—The natural balance of numerous spp. of plants and animals, particularly insects, in tropical forests is illustrated by the mutual relation between the populations of *Oreta carnea*, which defoliates gambier (*Uncaria gambir*), and its parasites, mainly *Brachymeria euploaeae*. In virgin forest, there are many spp. of phytophagous insects, as well as parasites and predators; each phytophagous insect has several insect enemies, and each plant sp. is host to several insect spp.; each sp. of parasite or predator preys upon several host insects. These conditions are favorable for the parasites; the combined effect of all of them tends to prevent serious outbreaks of the hosts. Extensive monocultures create conditions unfavorable for many phytophagous insects, but highly favorable for some of them. Parasites, reduced to the necessity of depending on one or a few host spp., are unable to maintain the balance between host and parasite.—*W. N. Sparhawk.*

8978. TAEUBER, CONRAD. *Agriculture and current population trends.* *Proc. Amer. Phil. Soc.* 80(4): 477-489. 1939.—Although the total population of the U. S. has increased by 33% since 1910, the proportion of this population living on farms has decreased 25%. The absolute number of people living on farms is about stationary. But this farm population, at the 1930 census, was reproducing itself at a rate 69% above its replacement rate, per generation. The farm population, including $\frac{1}{4}$ of the total population, contributed (in 1930) $\frac{1}{4}$ of the nation's births, and accounted for $\frac{1}{2}$ of the annual population increase. In consequence, extensive emigration from the farms to villages, towns, and cities is the rule. This paper, read in Nov., 1938, in a symposium on population growth, summarizes what is known about the trends of our agricultural population, and discusses the differential rates of reproduction among various portions of the farm population—negro, native white, and foreign-born white; southerners, northerners, and westerners;

those with higher incomes and those with lower; those with higher standards of living and those with lower standards; those with a self-sufficing economy and those with a commercial point-of-view. No single factor seems to account for the variations in reproductive rates among these various groups, but the author is especially interested in following the clue provided by the agricultural objectives of the people, i.e., whether they are mercantile or self-sufficing.—*F. W. Appel.*

BIOTHEMATICS, BIOMETEOROLOGY

(See also in this issue Entries 10038, 10232, 10238, 10320, 10321, 10450, 10497, 10506, 10510)

8979. BAYER, A. W., and J. R. H. COUTTS. *Morning and midday relative humidities at Pietermaritzburg, South Africa.* *S. African Jour. Sci.* 35: 154-157. 1939.—Readings for the period June 1, 1937 to May 31, 1938 show: A comparatively low mean midday relative humidity of 50%, which is 24% less than the mean morning humidity; a record of relative humidity as low as 5%; that midday relative humidity may be as much as 69% below morning humidity of the same day; and that the differences in morning and midday relative humidity may or may not be accompanied by changes in the absolute amt. of water vapor in the atmosphere.—*A. W. Bayer.*

8980. BÜTTNER, KONRAD. *Probleme der kosmischen Physik.* Vol. 18. *Physikalische Bioklimatologie.* v+155p. 37 fig. Akademische Verlagsgesellschaft: Leipzig, 1938. Pr. 8.40M.—The book summarizes the results of investigations and can serve as introduction into the border field between climatology and human biology. The matter is dealt with under the 2 main headings of radiation and heat balance. The former, with 163 references, deals with solar radiation and its transformation in the atmosphere, with special emphasis on the ultra-violet part of the spectrum. The instruments for measuring radiation are mentioned. The response of the human skin to u-v., and u-v.-dosimetry, is broadly discussed. Valuable are the numerous graphs and tables with measurements and variations of u-v. The 2d part, with 92 references, discusses the heat regulatory system of the human body, energy transformations, heat transfer between body and environment, skin temp., cooling power and physical measurements thereof, formulae for comfort zone, and effect of clothing. The present knowledge is critically reviewed throughout and the open questions are discussed, valuable suggestions for future work being given.—*H. Landsberg.*

8981. EVANS, MORGAN W. *Relation of latitude to certain phases of the growth of timothy.* *Amer. Jour. Bot.* 26(4): 212-218. 1 fig. 1939.—Plants of 9 selections of *Phleum pratense*, ranging from very early to very late, were grown at each one of 10 stations located at intervals extending from Gainesville, Florida, U. S. A., to Fort Vermilion, Alberta, Canada. In the south, selections which were progressively later had progressively shorter stems; in the north, the stems of the later selections grew to as great, or

even greater lengths than those of the early selections. For the earliest selections, the season for blooming progressed from south to north; for the latest selections, blooming occurred first at some mid-latitude, and then progressed both toward the north and toward the south. At a northern station, both early and late selections produced relatively large yields; at a southern station, late selections produced smaller yields than early selections.—*M. W. Evans.*

8982. HOPE, E. C. Weather and crop history in western Canada. *Canadian Soc. Tech. Agric. Rev.* 1938(16): 347-358. 2 fig. 1938.—From the data presented there appear to have been 2 definite, long periods of drought in western Canada, viz. 1885-96 and 1929-37, with a possible 3d from 1838 to 1848. Between 1862 and 1868 there were 4 very dry years in Manitoba, and from 1917 to 1921 there was a dry period over most of western Canada. The period of the 70's and early 80's was probably the wettest period in western Canada for over a century. Serious grasshopper outbreaks occurred in 1818-20, 1857-58, 1864-68, 1874-75, 1920-22, and 1931-37. A tabulated chronological summary of weather and crop history in this section is presented (1813-1937).—*Courtesy Exp. Sta. Rec.*

8983. LIST, GEORGE M. The effects of some low temperatures on the oystershell scale, *Lepidosaphes ulmi* Linne. *Jour. Colorado-Wyoming Acad. Sci.* 2(5): 36. 1939.—Mid-winter scales were exposed to temps. ranging from 7.5 to -40°F in steps of 2.5° for 2 hrs. Of the control 2.8% failed to hatch. Temps. above -22.5°F produced no definite reduction in hatching. Approximate failures were -25°F , 17%; -30° , 50%; -35° , 70%; -37.5° , 98% and -40° , 100%.—*E. D. Crabb.*

8984. LIST, GEORGE M. The effect of temperature upon egg deposition, egg hatch and nymphal development of *Paratriozia cockerelli* (Sulc). *Jour. Econ. Ent.* 32(1): 30-36. 1939.—Under controlled temps. the species thrived best at about 80°F . 70° was more favorable than 90° . Oviposition, hatching and survival were reduced under 90° constant temp.; 95° for only 2 and 3 hrs. per day permitted little increase in numbers. 100° for only 1 and 2 hrs. per day was lethal to eggs and nymphs and practically stopped egg laying. These results may explain the continued building up of populations throughout the season in the high-altitude cool areas of the State and for the great reduction in numbers during the mid-season, often below the point of injury in certain areas where temps. of 95° and above occur. High temps. may cause the adults to take flight. Trapping records taken during 3 seasons in the Grand Valley, Colorado, indicate that at least a considerable part of the spring infestation for that area comes through migrations. The adults were thought to be from spring breeding grounds and they were taken at a time when the populations in warm southern breeding areas were rapidly decreasing.—*G. M. List.*

8985. MARSHALL, G. E., and M. S. TROTH. The reciprocal of rainfall and temperature as it affects the apple crop. *Trans. Indiana Hort. Soc.* 1937: 123-129. 4 fig. 1937 (1938).—Drought years occur more or less regularly in 10-yr. cycles, and reference is made especially to such a period since 1930. With regard to the apple crop, it is claimed that a drought is seldom of itself destructive to such deep-rooted trees, but that great damage may result if it is accompanied by excessive temps., and especially when high wind velocity is a concomitant factor. Charts indicate the rainfall of the last 10 yrs. and during the growing season for each of 8 yrs. in Indiana. Summarized climatic data are presented to indicate some of the reasons why orchards were so severely damaged in 1936.—*Courtesy Exp. Sta. Rec.*

8986. MATHESON, M. A comparison of various field ecological light measuring instruments and a further contribution to our knowledge of the Eder-Hecht photometer and the Livingston radio atmometer. *S. African Jour. Sci.* 35: 263-273. 1939.—The Eder-Hecht photometer, the Livingston Radio-Atmometer, the Weston Photronic cell and the Solar Radiation Thermometer are discussed. A Callendar's Pyrheliometer was used as a standard of comparison. The Livingston Radio-Atmometer and the Solar Radiation Thermometer were found to be unreliable instruments even for rough estimates of light intensity. The Weston Photronic Cell and the Eder-Hecht Photometer are the most efficient instruments for field work. As rough

ecological instruments these will yield useful data, only if their limitations are realized and the readings carefully interpreted.—*M. Matheson.*

8987. MILLS, C. A. Climate and metabolic stress. *Amer. Jour. Hyg. Sect. A* 29(3): 147-164. 1939.—A critical survey of the available literature reveals a clear inverse relationship between prevailing mean environmental temp. level and resting combustion rate in man of middle temperate regions. Evidences of metabolic stress show up in the mortality and morbidity statistics of those diseases directly concerned with combustion processes, red cell production, and oxygen transportation by the circulatory system. Diseases found most concerned in this climatic stress are diabetes, toxic goiter, pernicious anemia, Addison's disease, and arteriosclerotic failure of the circulatory system. People living in the upper half of the Mississippi river basin (particularly in the Plains states from Kansas northward) show the most alarming evidences of this stress. It is even more pronounced among negroes than the white race. Urbanization seems definitely to accentuate the stress, although the metabolic breakdown and vascular failure are practically as severe in cities of 2500 to 1000 population as in the largest urban centers. The findings, as set forth, seem to provide a common etiologic factor for the diseases of metabolic breakdown and circulatory failure mentioned above. This factor is basically climatic, related to the ease of body heat loss, but its effects seem greatly accentuated by the added stress of urban unrest.—*C. A. Mills.*

8988. SARGENT, FREDERICK. Studies in the meteorology of upper-respiratory infections. I. *Bull. Amer. Meteorol. Soc.* 19(9): 385-391. 1938.—An analysis of the influence of the daily meteorological environment on the daily course of respiratory infections at the Phillips Exeter Academy, Exeter, New Hampshire, revealed the fact that the onset of the clinical symptoms of these infections is in part dependent on the weather. The inbreak of the cold air and the following period of cold dry air proved to be the affective meteorological situations. Barometric pressure and barometric variability offered the most consistent indices of the weather state for biometeorological studies. A seasonal shift in the onset time of respiratory infections with respect to the cold front was observed during the 3 yr. period of the investigation from Sept., 1935 through June, 1938.—*F. Sargent.*

8989. TURNAGE, WILLIAM V. Desert subsoil temperatures. *Soil Sci.* 47(3): 195-199. 1939.—The use of permanently installed thermocouples to obtain soil temp. readings at depths of 3, 6, and 12 feet in a typical desert soil is described. The mean annual temps. at all depths are higher than the mean air temp. Subsoil temps. in a desert are more complacent than those of non-desert regions, and are always above the minimum for root growth of most desert plants.—*W. V. Turnage.*

8990. VISHER, S. S. Rainfall-intensity contrasts in Indiana—causes and consequences. *Geogr. Rev.* 28(4): 627-637. 18 fig. 1938.—In this account the author discusses the advantages of Indiana for such a study, the aspects of rainfall-intensity studies, intensity contrasts revealed by other maps, causes for the contrasts in rainfall intensity, some apparent effects of the intensity contrasts, and rainfall intensity in relation to crop yields. This study of a sample area indicates significant contrasts in rainfall intensity as existing in a region previously believed to be distinctly uniform climatically. "The correspondence found between the distribution of this fundamental climatic factor and the distribution of various conditions affected by it suggests that similar studies of rainfall-intensity contrasts in other areas might throw light on problems of regional differences."—*Courtesy Exp. Sta. Rec.*

8991. WHITNEY, LESTER V. Continuous solar radiation measurements in Wisconsin lakes. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 175-200. 1938.—Thermopiles, Photocells and a Cambridge recorder were used to obtain continuous records of the quantity of solar radiation that penetrated to different depths in 4 lakes under various conditions of sun, sky and water surface. The continuous records agreed satisfactorily with calculated values, both as to the total change in transmission over the course of the

day and as to the general form of the calculated transmission curve.—*C. Juday*.

8992. WILSON, J. D. Evaporation studies. III. Ten years of evaporation at Wooster as measured with black and white atmometers. *Ohio Agric. Exp. Sta. Bimo. Bull.* 24(197): 11-25. 1939.—The 10-year averages showed evaporation to be greatest in July, followed by that of June, August, May, and Sept. in decreasing order. Radiant energy (recorded as B-W) was responsible for 29% of total water loss from black atmometer (B) over the 50-month period. This was 41% of total loss from the white atmometer (W). Rainfall exceeded evaporation in 13 of the 50 months; evaporation exceeded rainfall by at least 50% in 24 months and was at least twice as great in 18. Drouths occurred in 1930, 1932, 1933, 1934, and 1936, and evaporation was above the average in each of these years. 5 of 12 drouths began in May, one in June, 3 in July, and three began in Aug. and continued into Sept. The evaporation pan was more responsive to the radiant energy and temp. factors than were either the black or white atmometers. The mean value of the conversion factor for use in transposing atmometer data to inches of evaporation was 260 and 180 for the black and white instruments, respectively. The average value of an hour of sunshine, in terms of water evaporated from the black atmometer ($B-W/S$), was largest in June (1.3 cc.), followed by July, Aug., Sept., and May in that order.—*J. D. Wilson*.

ANIMAL

8993. ARCHER, ALLAN F. The ecology of the Mollusca of the Edwin S. George Reserve, Livingston County, Michigan. *Occas. Papers Mus. Zool. Univ. Michigan* 398. 1-24. 1939.—This is a study of the land and freshwater Mollusca of the George Reserve based on the ecological distribution of each species. 27 natural and artificial communities are considered, both land and freshwater, and grouped under aquatic, bog, marsh, sand, fire and clearing successions, as well as artificial and erosion communities. The bog lake community leads all other aquatic communities in the number of spp.; the oak-hickory community leads all other terrestrial communities. Two of the communities created by the clearing of the land also have a large number of species. No species have apparently become extinct because of human activities. The culture zone is characterized by some diminutive spp. of xerophilous tendencies, and the bigger mesophiles are not so numerous or important here as they are under natural woodland cover. The habitual distribution of 16 aquatic spp. and 36 terrestrial species is described.—*A. F. Archer*.

8994. BRUES, CHARLES T. The mimetic resemblance of flies of the genus *Systropus* to wasps. *Psyche* 46(1): 20-22. 1939.

8995. CHAPMAN, ROYAL N. Insect population problems in relation to insect outbreak. *Ecol. Monogr.* 9(3): 261-269. 1939.—This brief consideration of some of the problems of insect outbreaks indicates that the most important problem is to get critical research done: (1) on the fundamental problems of populations and the causes of their fluctuations, and (2) on the ecology of "outbreak pests" in advance of the outbreaks. This means working on a species of insect at times when it is not thought of as of any economic importance, even though there may be demands for remedial work on another species. The same economic demands which have built up great programs in economic entomology have often prevented or interrupted programs of sustained fundamental research which, in the long run, would give the greatest economic return.—*R. N. Chapman*.

8996. EMERSON, ALFRED E. Social coordination and the superorganism. *Amer. Midland Nat.* 21(1): 182-209. 1939.—The animal society is considered a high level of organismic evolution. Significant parallels may be drawn between the organization of lower cellular and multicellular individuals and the social organization of wasp, bee, ant, termite and human societies. A division of labor between the parts is demonstrated. The castes of the social insects are analogized with the cells of the multicellular organism and show division into germinal units and somatic units. Caste differentiation seems to rest upon mechanisms such as those found in cell differentiation, the different castes having the same genetic constitution aside from sexual distinctions.

Organismic patterns similar to the symmetry patterns of multicellular organisms can be shown in the social organism. These patterns are correlated with activity gradients. Regeneration of symmetry patterns as well as replicative parts are also found in the superorganism. Physiological dominance is found in the reactions to the queen. Chemical integration is shown by the "social hormone" determination of castes in termites. The mechanism of phagocytosis in reorganization is duplicated by cannibalism. Colony recognition on a chemical basis parallels tissue reactivity in transplants. The transmission of impulses through the colony resembles nerve conduction and coordination. Daily, seasonal and life cycles in the social organism parallel the periodic cycles of the multicellular organism. Social rejuvenescence and senescence can be demonstrated. The influence of the gene complex upon phylogeny of the superorganism is demonstrated through the transmission of hereditary patterns. Homologies, adaptations, convergence and degeneration are all shown on the superorganismic level. Natural selection of the superorganism as a whole is indicated by the evidence. Adaptive social evolution occurs without the possibility of a Lamarckian mechanism. The superorganism functions through the societal control of the environment of the organism much as the multicellular organism controls the environment of the cell. From both the standpoint of ontogeny and phylogeny, the superorganism parallels the integrative dynamics of the lower levels of organismic individuality. Analogy is freely used as evidence and is not considered superficial when it indicates environmental forces of fundamental importance. Analogy should be used with homology in the analysis and synthesis of scientific principles. The intraspecific superorganism is a high level of biological coordination which gives clues to integrative adjustments and their causes in both lower and higher organizations. Many significant parallels with the interspecific superorganism may also be found which lead directly to the dynamics of the biotic community.—*A. E. Emerson*.

8997. EMERSON, A. E. Populations of social insects. *Ecol. Monogr.* 9(3): 289-300. 1 fig. 1939.—The complex interrelationship of factors having an effect upon the population dynamics of social insects (wasps, bees, ants and termites) is diagrammed and discussed. The factors influencing the population complex are divided into the intraspecific societal factors, the interspecific societal factors, and the environmental factors, both physical and biotic. All these factors are divided into those tending to increase the population, those tending to decrease the population, and those with a fluctuating influence upon numbers. Among the many factors, emphasis is placed upon social hormones, fecundity, cannibalism, types of food, predatism, nest-building, and environmental control. The integrated population unit is regarded as the result of natural selection acting upon the group as a whole. Both intraspecific and interspecific groups are considered as objectively real biological units.—*A. E. Emerson*.

8998. FICHTER, EDSON. An ecological study of Wyoming spruce-fir forest arthropods with special reference to stratification. *Ecol. Monogr.* 9(2): 183-215. 4 fig. 1939.—The Wyoming spruce-fir forest habitat, studied in summer at an altitude of 10,000 ft., shows a measurable stratification of physical environmental factors, detd. in this study for evaporating power of the air only. Evaporation stress increases with elevation above the forest floor, as shown by comparative evaporation rates from atmometers exposed at 0.1 meter, 1 m., and 3 m. Considering the rate of evaporation at the 3-m. level as 100%, the rates at the 0.1-m. level and the 1-m. level were 48.6% and 72.4%, respectively. Stratification of physical factors of the environment, governed by the dominant forest cover (Shelford, 1912), results in a stratification of the arthropod biota as detd. by random sweep collections in the vegetation at these levels, and expressed by the composition and distribution of animal stratal societies. Such groupings are not permanent, even during summer; they show vertical shifts in position and changes in composition in response to vertical shifts in physical factors. They are therefore subordinate. Consecutive weekly evaporation rates exhibited differences as great as 74.6%; rel. humidity records showed a maximum range within a week as great as 67%, a mean range of 49.3%, and

a maximum range of 74.5% for the season; temp. showed max. range values as great as 45.4° F within a single week with a mean range value of 33.9° F, and a maximum seasonal range of 49.5° F. These data, collected during July and Aug., provide evidence that pronounced shifts in physical factors do occur in the lower epiphytic strata of the spruce-fir forest at 10,000 feet. Such marked ranges in temp. did not occur in the litter-duff stratum. A prevalent of any stratal society gaining its prevalence through response to physical factors, in part at least, is therefore probably of value as an indicator of immediate environmental conditions. Saprophytic acarines appeared as the prevalent of the litter-duff and the undergrowth strata. Diptera prevailed in the herb-half-shrub stratum, while a homopteran was the prevalent in the low tree stratum. Although biotic factors of the environment undoubtedly exert considerable influence in producing stratification of animal societies, they were not investigated in this study. Complicating the picture of stratal animal societies is the occurrence of seasonal societies, somewhat indicated in the study by the appearance of an aestival high point in total population and in the numbers of prevalent forms, and of an upward trend at the close of the study, suggesting a possible autumnal peak.—*Auth. summ.*

8999. FROHNE, W. CARRINGTON. Biology of certain subaquatic flies reared from emergent water plants. *Papers Michigan Acad. Sci. Arts and Lett.* 24(2): 139-147. 1938 (1939).—Some taxonomically remote, large phytophagous Diptera characterize the insect fauna of emergent aquatic plants in the lakes of northern U. S. Apparently by convergent evolution they have assumed similar aquatic adaptations. The species are: (1) *Asteromyia phragmites* and (2) *Hormomyia* sp. (Cecidomyiidae), (3) *Oligochaetus* sp. (Dolichopodidae), (4) *Cordylura latifrons* (Scatophagidae), (5) *Chloropisca* sp. and (6) *Diptotoxa microcera* (Chloropidae), (7) *Leucopis griseola* (Ochthiphiidae), and (8) *Agromyza longipennis* (Agromyzidae). Their life histories are noted. These spp. are associated respectively for shelter and food with: *Phragmites communis*; *Carex vesicaria*; *Eleocharis palustris* var. *major*; *Scirpus occidentalis*, and *S. americanus*; the spp. of *Scirpus* mentioned, and *Scirpus validus*; all 3 mentioned spp. of *Scirpus*; *S. occidentalis*; and *S. americanus* and *S. occidentalis*. The following parasitic Hymenoptera were reared: *Epiurus* sp. (Ichneumonidae) from (1); *Leptacis* sp. (Platygasteridae) from (2); *Aphaereta* sp. (Braconidae) from (4); and *Dacnusa* sp. (Braconidae) from the mine of (3).—*W. C. Frohne.*

9000. HAMMOND, E. CUYLER. Biological effects of population density in lower organisms. *Quart. Rev. Biol.* 13(4): 421-438. 1938; 14(1): 35-59. 1939.—Certain elementary benefits from limited crowding of lower organisms may have been a large factor in the original development of the social instinct. In such diverse forms as protozoa, crustaceans, worms, marine and fresh water fish, and amphibians the formation of groups may be a protection against toxic substances dissolved in the liquid medium, the presence of noxious solids, extremes of temp. and other elements of bad environment. On the other hand, severe crowding is almost invariably harmful. The accumulation of metabolic waste products in a liquid medium decreases the longevity, growth and reproductive rate of animals living in it. Other noxious results of crowding are the decreased food supply and the mechanical disturbance of the individual. The effects of certain other environmental factors, particularly temp., on the speed of development, mortality, fecundity, and morphology of *Drosophila* are also reviewed.—*H. G. Swann.*

9001. KING, K. M. Population studies of soil insects. *Ecol. Monogr.* 9(3): 270-288. 1939.—After a brief characterization of soil insects and their environment, the discussion falls into 2 main sections:—a comprehensive critical appraisal, in terms of underlying principles, of methods of sampling for soil insect populations; and an examination of some of the results that have been secured in such study. Although data in support of the ideas expressed are cited but incompletely or only by reference, the opinions and analysis are the development from over 16 years' field work. Population studies afford a procedure of very great practical and scientific potentiality, if properly utilized; and quanti-

tative field study should be complementary with laboratory experimentation, in all biological research.—*K. M. King.*

9002. MACGINITIE, G. E. Littoral marine communities. *Amer. Midland Nat.* 21(1): 28-55. 1939.—Marine animal communities are not static affairs. Variation is the most important principle in ecology. Animals can not be pigeon-holed under unit factors. No apparatus yet used is sufficiently efficient to provide a complete picture of ocean bottom communities. Free-living animals migrate greater distances on smooth bottom than on rocky shores. Sand beaches provide habitat for burrowers only, and are rich in food because of the plankton destroyed in the breakers and because of the green algae and bacteria growing on the moist sand between tides. Marine communities are subject to change through cataclysm, migration, old age, and larval settling chance. Dominance, while apparent in some rocky shore communities, fades out in estuaries and ocean bottoms. Using the locality, rather than the generic names of animals, for naming a community is recommended. Dominants may be dominant in entirely different communities, and their use to name a community may cause the worker to make very small community areas. Background on the part of the worker is shown to be more important than in any other branch of biology. Individual life histories of members of the community are necessary to a fuller understanding of the sociology of marine animal communities, for every animal is a part of the environment of the community.—*G. E. MacGinitie.*

9003. MICHELbacher, A. E. Seasonal variation in the distribution of two species of Symphyla found in California. *Jour. Econ. Ent.* 32(1): 53-57. 1939.—Population trends of 2 species of symphylans having markedly different reactions are considered. The garden centipede, *Scutigera immaculata*, is very active, and moves readily about in the soil so that its distribution is greatly influenced by such factors as temp., moisture, soil structure and growing vegetation. It is not able to withstand flooding as well as *Symphylella subterranea*. *Symphylella subterranea* is more sluggish in its movements and is confined to the lower soil levels which have a rather stable environment. It is apparently little influenced by the above mentioned factors. The lowest symphylan populations are likely to occur during the late winter and early spring and the highest during the summer after the period of heavy reproduction.—*A. E. Michelbacher.*

9004. SMITH, HARRY SCOTT. Insect populations in relation to biological control. *Ecol. Monogr.* 9(3): 311-320. 1 fig. 1939.—Population densities of insects have static and dynamic aspects. Since the direction and rates of population growth, as seen in cyclic changes, are detd. by births relative to deaths, the % of parasitization may have an important influence on the rate of growth, but it does not determine the mean density from which this growth is measured. No matter what the mean density may be, births and deaths are equal on the avg. and, therefore, the total % of mortality is fixed by the birth rate. The effect of parasitism on the mean population density of a host sp. can be detd. only by studying how the % of parasitization is influenced by changes in the population density of the host sp. Since in sp. which are in equilibrium with their environment only one of the young per parent can reach maturity, the potential reproductive capacity of a parasite cannot have an important influence on the avg. population density of its host. A parasite's power of discovery, combined with certain other environmental factors, determines the level of the host population. Insect predators as a group are less effective than parasites. The effectiveness of an entomophagous insect is influenced by the nature of its host distr. The interaction between specific parasite and host tends to break up a uniform host distr. into small discontinuous units which reach a peak and then decline to near extermination while new colonies are forming in the vicinity.—*H. Compere.*

9005. STEPHENSON, T. A. The constitution of the intertidal fauna and flora of South Africa. I. *Jour. Linn. Soc. [London] Zool.* 40: 487-536. 4 pl., 13 fig. 1938.—Summarizes and discusses survey-work done during 1932-1937, by several authors, on the S. African coasts, from Port Nolloth to Durban. The intertidal zone is divided into the following zones, from above downwards (i) *Littorina* zone (partly supralittoral) in which species of *Littorina* are

prominent; (ii) Balanoid zone characterized by acorn barnacles and/or *Patella granularis*; (iii) *Cochlear* or *Argenvillei* zones, present only along part of the coast and characterized respectively by dense populations of *Patella cochlear* and *P. argenvillei*; and (iv) Sublittoral fringe, in which Laminarian, Ascidian, Zoanthid or Mixed Algal communities tend to dominate. The principal variations in the populations of these zones, around the coast, are indicated. The conceptions of a *Littorina* zone and of a Sublittoral fringe, and of a Balanoid zone (or of some counterpart) are widely applicable in the intertidal zones of the world; comparisons with British coasts and coral reefs are given. As a detailed example of distr. in S. Africa, an account of the vertical and horizontal distribution of the Patellidae is given.—*T. A. Stephenson*.

9006. WATSON, J. R., and H. E. BRATLEY. Some ecological notes on the lubberly locust—*Romalea micropter* Beauv. *Florida Ent.* 22(2): 31. 1939.—The paper discusses the relation of the soil to the deposition of the eggs and the relation of farms where large numbers of bulbs were grown to the increase of the lubberly locust. The young locusts migrate into these farms from distances of 500-600 ft.—*J. R. Watson*.

9007. WELCH, E. V. Insects found on aircraft at Miami, Fla., in 1938. *Publ. Health Repts.* 54(14): 561-566. 1939.—During the year, 398 incoming Pan American Aircraft from Central America, S. America, the Canal Zone, and Mexico were inspected for the purpose of detecting the presence of live mosquitoes, particularly *Aedes aegypti*, which might convey yellow fever. 187 planes were found to harbor 486 dead and 166 live insects of various spp. 45 mosquitoes were found on the planes—40 dead and 5 alive. House flies, midges, and gnats were the most prevalent insects recovered. Other insects found were beetles, wasps, ants, moths, cockroaches, chinch-bugs, and stable flies. Two spiders were found on the planes. Precautions were taken by the airways and health authorities for the control of mosquitoes and other insects aboard the aircraft.—*E. V. Welch*.

PLANT

9008. BAKER, J. R. Rain-forest in Ceylon. *Bull. Miscell. Inform. Kew* 1938(1): 9-16. 2 pl. 1938.—The Sinharaja Forest, covering 90 sq. miles and situated in the wet (south-west) part of Ceylon, is the only considerable area of virgin tropical rain-forest on the Island. Despite the small climatic changes during the year, the flowering and fruiting is largely seasonal, and some of the largest trees are deciduous. Drip points to leaves or leaflets occur in most of the species.—*J. R. Baker*.

9009. BOR, N. L. The vegetation of the Nilgiris. *Indian Forester* 64(10): 600-609. 1938.—Reference is made to an earlier article (by Mr. Ranganathan) on the subject in which 2 climatic climaxes of such widely divergent life forms, as grassland and forest, were mentioned to co-exist in the Nilgiris against the current accepted views of most ecologists. These views are discussed in some detail, and it is concluded that the Shola forest is the relict of an evergreen forest climax which has been pushed back to its last stronghold by fire and grazing that have rendered stable the grassland which is only a biotic climax.—*J. N. Sen Gupta*.

9010. CAIN, STANLEY A. The climax and its complexities. *Amer. Midland Nat.* 21(1): 146-181. 1939.—The complexity of the climax is stated to be due to the gradual nature of change of climatic conditions throughout the range of the climax "type," to the local microclimatic conditions, possibly to the edaphic conditions, to availability of species, and to the ecological amplitudes of species. A discussion of the system and philosophy of Clements is compared with the concepts and methods of plant sociologists with the conclusion that Clements' dynamic interpretation is sound. Many disagreements with Clements' interpretations of vegetation are found to be due to a failure to understand his concepts. Differences between plant sociologists and Clementsian ecologists, and between polyclimax and monocl原因 adherents are not as great as terminological differences and methods would indicate. The fundamental difference is found to reside in the contrast between static and dynamic aspects of vegetation and vegetation interpretations. The burden of proof of succession in any particular

case, however, must rest with the "dynamic ecologists" and not be assumed on an hypothecation of a climax.—*S. A. Cain*.

9011. CONARD, HENRY S. Plant associations on land. *Amer. Midland Nat.* 21(1): 1-27. 1939.—Paper read at Symposium on plant and animal communities at Cold Spring Harbor Biological Laboratory, Sept. 1938. The Zurich-Montpellier School of Ecology began with Kerner; it is based on stable communities (Hungarian Pusztas, beech-woods, spruce forest, mugho pines, alpine vegetation) of central Europe. The Scandinavian School, in a meager marginal vegetation, uses 1-layer communities. The Danish School, following Raunkiaer, uses statistics of life forms, etc. Cowles and Clements in America worked on unstable marginal lands, emphasizing succession. Common bases of investigation and description are desirable. The association concept of the VI Internat. Bot. Congress is adopted. Sample associations are described, selected from literature, from simplest assoc. of *Protococcus*, through moss assoc., lichen assoc., low vascular-plant assoc., grassland, low forest, high forest, coniferous forest.—*H. S. Conard*.

9012. DITTMER, H. J. A comparative study of the subterranean members of three field grasses. *Science* 88(2290): 482. 1938.—A comparative study was made of the roots and root hairs in upper soil levels for oats, winter rye, and Kentucky bluegrass. The last had by far the most extensive underground development, the average soil core 3 in. in diam. and 6 in. long containing 84,500 roots totaling 1,260 ft. in length and 51,600,000 root hairs totaling 32 miles.—*Courtesy Exp. Sta. Rec.*

9013. EDWARDS, M. V. Effect of burning of slash on soil and succeeding vegetation. *Indian Forester* 64(7): 438-443. 1938.—The effect of burning slash on soil and succeeding vegetation is discussed from the aspects of effect on mineral constituents of the soil, giving references to work done in several countries. Burning the vegetation returns to the soil all the mineral elements taken out by the plants during life. Burning and the resulting formation of basic ash materials increased the nitrification and resulted in an increase in the soluble mineral constituents of the soil, but destroyed the humus layer. Continuous and repeated burning, however, does not improve forest fertility.—*J. N. Sen Gupta*.

9014. GLOVER, P. E., and H. J. van RENSBURG. A contribution to the ecology of the Highveld grassland at Frankenwald, in relation to grazing and burning. *S. African Jour. Sci.* 35: 274-279. 1939.—A set of expts., the "C, D and E Series," was laid out in Dec. 1932. The site chosen was the most homogeneous undisturbed veld available. The object of these expts. was to determine the effects of burning, grazing and trampling on undisturbed veld, over varying periods, and to study changes in plant succession brought about by these treatments. Small plots were used in this instance to test their adequacy, not as replicas of large ones, but as "result indicators" for the management of large plots. Burning in Aug. did not seem to have a detrimental effect on any important grass except *Digitaria tricholaenoides*. This grass showed a decrease in cover not only in the burnt plots, but also in the control plots. Here the decrease was probably attributable to decreased light intensities owing to rank bunch grasses. *Trachypogon plumosus* and *Tristachya hispida* showed a consistent increase in the controls and the C series. They were high up in the sere. Burning and moderate grazing had no adverse effects upon the veld. In series E, the plots which had the longest treatment showed the greatest increase in *Cynodon dactylon*, and in weeds. The greatest decrease in the original veld grasses occurred here. The treatment resulted in a severe setback to succession.—*Authors*.

9015. GORRIE, R. M. The conservation of Punjab water supplies. *Indian Forester* 64(11): 675-687. 1938.—Large parts of the Punjab foothills are being practically obliterated by erosion caused principally by destruction or alteration of the natural plant cover, resulting principally from grazing and also from the system of field cultivation with clearfelling and burning prevalent in the foot hill as well as high hill areas where contour trenching is unknown. . . . Different types of erosion damage are also discussed with details of recommendation for control. There are possibilities for improving water conservation everywhere by better farming practices

and better control of live stock to prevent overgrazing.—J. N. Sen Gupta.

9016. HANSEN, HENRY P. Pollen analysis of a bog in northern Idaho. *Amer. Jour. Bot.* 26(4): 225-228. 1939.—Pollen analysis of a bog in Northern Idaho located in a white pine (*Pinus monticola*) type of subclimax status, and within a cedar-hemlock-white fir climax formation shows several stages of postglacial forest succession and climate. The pioneer forests consisted of white pine and lodgepole pine (*P. contorta*), marking an initial cool and medium dry period. An abundance of Douglas fir (*Pseudotsuga mucronata*), and grasses may reflect a 2d warmer and perhaps dryer period. A 3d period of increase in white pine to become dominant over lodgepole pine indicates increasing coolness and moisture. This period was followed by a trend toward climax development of cedar (*Thuja plicata*), hemlock (*Tsuga heterophylla*), and white fir (*Abies grandis*). A 5th period of white pine increase was followed by another climax development trend. Climate probably has remained uniform since the maximum coolness and moisture of the third period was reached.—H. P. Hansen.

9017. HARRISON-SMITH, J. L. The kauri as a host tree. *New Zealand Jour. Forest.* 4(3): 173-177. 1938.—Altogether, 53 spp. of plants (listed) belonging to 37 genera were found on 7 kauri (*Agathis australis*) trees from several localities in the Waipoua Forest, New Zealand. Of these, 21 were true epiphytes, 2 were climbers, 8 or 9 were forest trees, and the others were small plants usually found on the ground.—W. N. Sparhawk.

9018. JONAS, FR. Das letzte Interglazial (Riss-Würm) in Osteuropa. Ein Beitrag zur Quartärstratigraphie des Ostens. *Beih. Bot. Centralbl. Abt. B.* 56(1/2): 175-212. 10 fig. 1936.—Some essential regional differences in the vegetation of the interglacial periods are described from the study of 8 east European Riss-Würm (RWI) interglacial bog profiles. *Carpinus* and *Abies* extended farther to the northeast during the RWI than in the post-glacial; *Carpinus* especially underwent the greatest reduction in its area while *Fagus* attained a much wider distribution in middle Europe in the post-glacial than in the RWI. The interglacial profiles of Leskovichi and Lojew, which lie farthest to the southeast, show that the zone of forests at that time extended farther into the steppes than at present, probably a result of higher precipitation. Accordingly we must explain the limited distribution of the beech in the RWI. The high percentage of *Fagus* in the late Tertiary deposits probably comes from *F. orientalis*. It is possible that *F. silvatica* is of late Diluvial origin and attained its first limited distribution in the RWI but its maximum distribution only in the post-glacial. In agreement therewith attention may be called to the absence of high moors. The sphagnum associations of forest moors of that time consisted of a mixture of eutrophic and oligotrophic vegetation. The characteristic generations-complex of the north European post-glacial high moor vegetation was still absent in the RWI. In place of it soligenous formations such as *Empetrum-Betula nana* and *Calluna* heath moors had already appeared. These latter were present in the North Sea region at the end of the 3d phase of the RWI. We know that Eem transgression was in the warm period of the RWI. Its effect was greater than that of the *Litorina* transgression, particularly in the basin, as a result of which the influence of the Atlantic climate must have been shifted further to the east than was the case in the post-glacial.—Auth. summ. (tr. by H. F. Bergman).

9019. JUDD, B. IRA, and M. D. WELDON. Some changes in the soil during natural succession of vegetation after abandonment in western Nebraska. *Jour. Amer. Soc. Agron.* 31(3): 217-228. 1939.—In a study of soil changes during natural succession of vegetation on abandoned land in Kimball County, Nebraska, determinations were made of water infiltration rate, percolation rate, volume-weight, state of aggregation, and the quantity of plant roots, organic matter, and nitrogen in the soil of cultivated, abandoned, and native grassland fields. Infiltration and percolation were rapid in wheat stubble and in fields abandoned for several years, but were slow in native grassland and in fields abandoned for 1 year. The volume-weight and percentage of aggregation larger than 0.5 mm were highest in soils having the lowest infiltration rate and were generally lowest where

infiltration was most rapid. Organic matter and N tended to be lower in cultivated and abandoned fields than under native grasses, but the difference was not statistically significant. The root content of the soil of cultivated fields was $\frac{1}{4}$ that under native grasses. Several years of abandonment increased the root content slightly. Under native grasses 7.3% of the soil organic matter in the surface 6 in. and 2.2% of that in the 2d 6 in. consisted of plant roots. Under cultivation or abandonment, the % of root material was much smaller.—M. D. Weldon.

9020. KESSELL, S. L. Effect of burning of slash on soil and succeeding vegetation. *Indian Forester* 64(7): 443-445. 1938.—According to modern trends of thought and practice in Australia fire is no longer considered essential for the reproduction of Eucalypts there. A strong surface fire will, on the contrary, destroy practically all their seed except that carried by the trees at the time of the fire. Seedlings on and around ash beds derive benefit not only from the fertilizing value of the ash but also from the absence of grass and scrub competition for a long time on ash beds.—J. N. Sen Gupta.

9021. LAWRENCE, DONALD B. Some features of the vegetation of the Columbia River Gorge with special reference to asymmetry in forest trees. *Ecol. Monogr.* 9(2): 217-257. Map, 5 fig. 1939.—Some of the main physical features of the Columbia Gorge are discussed, including geology, topography, soils, flood history, and tributary drainage systems. Notable vegetational features are described, with special reference to habitat conditions as these differ from west to east and from north to south. The gorge appears to have acted as an east-west corridor for and as a N-S barrier to plant migration. Observations concerning flood tolerance of firs and pines lead to the conclusion that Douglas fir is very intolerant, ponderosa pine considerably more tolerant. The one-sided tree crowns of the western and eastern regions of the gorge, especially those of Douglas fir, are described, with photographs, and the weather condition control of crown asymmetry is described and discussed. In the western part, the firs are pruned through breakage due to the action of occasional easterly winter gales accompanied by heavy deposition of ice. These crowns extend only in a westerly direction. These firs are also subject to parch blight by which the foliage and branchlets on many unbroken branches are winter-killed. In the eastern part, the firs show little or no signs of storm breakage or parch blight, but they are wind-trained, by the strong westerly winds of summer; their crowns generally extend only in an easterly direction. In the middle region of the gorge, in the vicinity of the Cascade Rapids, both forms of fir crown may be seen. The western, storm-pruned type of tree asymmetry has apparently not been described previously.—Auth. summ.

9022. LEGLER, FRITZ. Studien über die Ökologie der rezenten und fossilen Diatomeenflora des Egerer-Franzensbader Tertiärbeckens. I. Das Quellgebiet und der Kieselgur-schild der Soos. *Beih. Bot. Centralbl. Abt. A.* 59(1/2): 1-116. 7 fig. 1939.—Three layers of sediment are found in the diatom deposits of the Soos: *Anomoeoneis*-sediment (A), a black, mineralized kieselguhr with about 20% iron sulfide; turf sediment (B), a brown kieselguhr, up to more than 1 m. thick, with 2-70% diatoms (*Pinnularia*) with intermixed plant remains; *Nitzschia*-sediment (C), the most recent, bright brown to bright gray kieselguhr, 8-15 cm. thick. A is the oldest; it was deposited in the pine-hazel period. The formation of B lasted from the oak mixed forest-spruce period up to the recent pine-spruce period, in which C also must have been deposited. While A and C show a dominance of mesohalophile and halophile forms, the indifferent *Pinnularia* preponderate in B. The recent diatom flora in the Soos far exceeds the fossil in number of spp. As almost all fossil diatoms are now present the ecological relations at the time of deposition of the sediments seem not essentially different from those of today. The diatom flora of a water containing sulphates and of a water containing chlorides at the same conc. and with other ecological factors alike includes the same "indicator" forms. At the same time the relation of the cations is essential. Two new terms are proposed for the characterization of the tolerance of many diatoms towards large amounts of active iron: eurysiderile for those for which the range of tolerance is

wide; and stenoserile for those with a narrow Fe-range and greater sensitivity toward large amts. of active iron. Diatoms new for Bohemia are listed. Chemical methods for culturing diatoms are given in an appendix.—*From auth. summ.* (tr. by H. F. Bergman).

9023. MACDOUGAL, D. T. Studies of root systems of trees. *Eastern Shade Tree Conference, Proceedings* Dec. 8, 9, 1938. p.67-68. 1939.—Systematized information as to stature and disposition of roots of trees beyond the seedling and nursery stage is very fragmentary. The results of studies from excavated and uprooted Monterey Pines showed that of the woody material of this pine tree $\frac{1}{4}$ - $\frac{1}{2}$ of the total amount in trunks and branches was used in the root systems. Taken in connection with dendrographic studies, it is apparent that the flaring bases of trunks and the abruptly enlarged basal portions of attached roots constitute a distinct physiological unit, or well-defined region, so far as period of seasonal growth, activity of the cambium and conc. of growth-promoting substances are concerned. Its individuality becomes more marked with age and it is this mass of woody material that undergoes maximum stresses from the flexion of trunks swayed by the wind. Some of these features are reflected in the results of tests for specific gravity, crushing strength and modulus of rupture in the engineering laboratory. Field and laboratory studies of the development of root-systems with respect to: (a) Corresponding stage of the crown; (b) Nature of substratum; (c) Character of stand and associations; (d) Extent and volume of root-system, should be possible with trees that have been uprooted during storms. Systematized information as to the above features would constitute a contribution of permanent value in the physiology of trees, in forestry, horticulture and in all kinds of silviculture and ornamental planting.—*R. Silverman.*

9024. MEIER, F. C., and E. ARTSCHWAGER. Airplane collections of sugar-beet pollen. *Science* 88(2291): 507, 508. 1938.—In the Rio Grande Valley in southern New Mexico, where sugar beets were being grown for seed production in 1938, an airplane flight was made on June 3 with a series of short exposures of agar plates at various altitudes from 1,000 to 5,000 ft. Sugar beet pollen grains, some of which germinated in the plates, were found at all altitudes with the number becoming fewer at 4,000 ft. At the 5,000-ft. level, which corresponds to the so-called "dust horizon," the number seemed appreciably larger than for the other altitudes except the lowest. The plates showed also numerous fungus spores, plant hairs, and pollen from other spp. of plants, notably *Pinus* spp.—*Courtesy Exp. Sta. Rec.*

9025. MICHALSKI, A., et F.-X. SKUPIEŃSKI. Recherches écologiques sur *Physarum didermoides* Rost, myxomycète endosporé. *Compt. Rend. Acad. Sci. [Paris]* 208(3): 225-227. 1939.

9026. OVERBECK, FRITZ, und SIEGFRIED SCHNEIDER. Mooruntersuchungen bei Lüneburg und bei Bremen und die Reliktnatur von *Betula nana* L. in Nord-westdeutschland. *Zeitschr. Bot.* 33(1/2): 1-61. 1938.—In Melbeck Moor, 7 km. south of Lüneburg, an almost continuous record of *Betula nana* has been traced from the close of the sub-arctic pine-birch period to the period in which *Fagus* is represented. The main development of *Betula nana* may be traced on into the warmer period, where along the Atlantic section, extensive peat layers occur, consisting almost entirely of the remains of dwarf birch. As to the distribution of *Sphagnum* spp. in peat of recent deposition, the eastern limits for *S. imbricatum* and *S. papillosum* were reached in Lower Saxony. These limits are surprisingly sharp and extend from Tostedt over Rotenburg, near Bremen, over Diepholz in the direction of Brams. At Dannenberg near Bremen through a moor profile, almost 10 m. thick, and with a preponderance of organic deposits from a small lake basin, we pass directly to the woodless Tundra period. The main point here is that we get some evidence of temp. fluctuation in the late glacial period. Owing to the numerous analytical tests made on Melbeck and Hellwig Moors and at Dannenberg, this region may be divided into diagrammatic zones for a preliminary attempt to develop a pollen distribution map for Lower Saxony. For Zone X including the Bronze Age, and Zone (1) X including the Neolithic, time scales may be obtained by comparison

with archaeological findings. For the remaining zones a time scale can only be deduced by comparison with Danish, South Swedish and East Prussian pollen diagrams.—*J. H. Priestley.*

9027. PONT, J. W. Ecological applications of the stomatal index. *Beih. Bot. Centralbl. Abt. A.* 59(1/2): 214-224. 1939.—A mathematical analysis of the observations required for determining the stomatal index of a sample has shown that a high degree of accuracy is obtainable. The size of the leaf-area required and the number of individual observations can be small. Significant differences in the stomatal indices of samples from different localities have been observed. The influence of slope exposure, slope level, and the effect of the presence of trees on the stomatal index of grass has been demonstrated. The method may prove to be of value in investigations on the water relations of plants.—*Auth. summ.*

9028. RANGANATHAN, C. R. Studies in the ecology of the Shola grassland vegetation of the Nilgiri Plateau. *Indian Forester* 64(9): 523-541. 1938.—The natural vegetation of the plateau is a mixture of temperate evergreen forest (shola), its seres and grass. The grasslands are extensive and are practically confined to the western plateau which is subject to annual ground frost. Here the shola is reduced to small, isolated woods occupying folds and hollows on the slopes and is relatively more abundant on slopes protected from the morning sun. The absence of fringing forest along perennial water-courses is a feature of the frost zone. The study of the altitudinal zonation shows shola to be the forest climax. Its known antiquity and stability, indicate that the grass is also a natural climax. The relative distribution of the 2 climaxes is governed by the incidence of frost. Frost damage on the Nilgiris is confined to young plants and is probably a kind of wilting effect due to plants exposed to the morning sun being unable to draw water from the frozen soil. The shola occupies slopes protected from the morning sun and sites where the danger of freezing is neutralized by abundant moving soil water. The grass though destroyed by frost revives quickly owing to its perennial rootstocks and its ability to spread vegetatively.—*Auth. abst.*

9029. REGEL, C. Geobotanische Beobachtungen auf einer Reise in Marokko und in der Sahara. *Veröffentl. Geobot. Forschungsinst. Rübel* 14: 192-216. 1939.—The so-called steppes of Morocco are not real steppes in the narrower (Russian) sense as they lack the *chernosiom* soil profile. The climatic conditions are also quite different: the steppe region has cold winters with well developed snow cover, precipitation maximum in summer. Morocco has mild winters with no snow cover and precipitation maximum in winter. The *Stipa tenacissima* "steppe" of Morocco is a typical semi-desert. Besides there are also found typical *durierbosae*, which are, however, not true steppes, e.g., the *Stipa tortilis* community, secondary and coming into existence when the original forests were destroyed.—As trees can grow in edaphically favorable places in deserts and steppes (oases, etc.) the desert and steppe climates seem not to preclude the growth of trees, but the soil precludes the growth of all but the hardiest trees and bushes.—Deserts seem to encroach on the forested or arable lands, chiefly because of mismanagement. Secondary deserts come into existence in the same way as secondary "steppes," they even include pseudo-oases where the original plant-cover is preserved.—The distribution of *Quercus ilex* and the *Querceta ilicis* is discussed. In the W parts of the Mediterranean regions these communities constitute climaxes, in the eastern parts just paraclimaxes, as they are here confined to locally moister areas. The climax at the timberline is the same community that constitutes the lowland vegetation region further to the north. The climax at the foot of the mountain constitutes the timberline climax in the vegetation region further south.—*K. Faegri.*

9030. SCOTT, J. D., and N. G. Van Breda. Preliminary studies on the root systems of *Pentzia incana*-forma on the Worcester Veld Reserve. *S. African Jour. Sci.* 35: 280-287. 1939.—This species is not widespread on the Reserve but it occurs on light, loamy soils, in very definitely demarcated plant communities. Under normal conditions a tap root is first formed which grows to a depth of 1-1½ feet in 4-5

months. It then splits up into 2 or 3 roots which may penetrate to 3 feet but there is no longer a main tap root. Once the tap root has split, the main root development takes place in the surface 3 inches of soil where the lateral roots ramify considerably. Stolons also give rise to masses of adventitious roots. A feature of the species is the enormous number of root hairs found on all the finer roots; under moist conditions, the whole root is covered by a mass of fine root hairs. This type of shallow root system probably accounts for the rapid drying up of the plant in drought and its rapid recovery after rains.—*Authors.*

9031. SMYTHIES, E. A. Soil erosion problems in India. *Indian Forester* 64(11): 704-708. 1938.—Destruction of forest growth in mountains, without compensatory terracing and regular cultivation, leads to a tremendous increase of erosion, avalanches, destructive floods, etc. In the plains and foothill areas also the change of the once fertile lands into desert has been ascribed by many to the destruction of the natural vegetation by man and his cattle. In the Jumna-Chambal basin in Northern India, between a quarter and a half million acres of land have had 20 to 40 feet depth of soil eroded, which represents a capital loss. Expts. carried out by the forest department during the past 25 yrs. in such areas have proved that control of grazing alone is sufficient to bring back the natural vegetation and check further erosion.—*J. N. Sen Gupta.*

9032. STEBBING, E. P. The man-made desert in Africa—erosion and drought. *Indian Forester* 64(7): 454-466. 1938.—There has arisen some confusion as to what is actually meant by erosion in different parts of the world. The soil erosion being experienced in several parts of Africa is mainly attributed to excessive land utilization. The intensive wasteful utilization of the soil upsets nature's balance, resulting in an interruption of the water-supplies, including that of rainfall. It is suggested that when the erosion and rainfall have arrived at the intermittent stage, amelioration works can no longer with safety be delayed. Closure of eroded areas to cultivation, to grazing and to firing will work marvels in Africa.—*J. N. Sen Gupta.*

9033. STOPP, F. *Quercus cerris* L. im Friedewald nördlich Radebeul. *Tharandter Forstl. Jahrb.* 90(1): 60-68. 6 fig. 1939.—96 wild *Q. cerris* saplings were found scattered over an area of 9 sq. km. north of Dresden. The parent tree was located in a garden 1-3 km. away. The acorns must have been distrib. by jays.—*W. N. Sparhawk.*

9034. TRAPNELL, C. G. Ecological methods in the study of native agriculture in northern Rhodesia. *Bull. Miscell. Inform. Kew* 1937(1): 1-10. 4 maps. 1937.—Methods employed on the ecological survey of Northern Rhodesia are discussed, with summaries of soil and vegetation types and of native agricultural systems of the western half of the Territory. Composite vegetation—soil units are employed for mapping purposes. A close relationship is found between main soil groups, vegetation types and native agricultural practice, which is associated with the native's use of significant plant indicators in selecting land for his staple crops. Ecological survey is held to provide the best means of understanding the native's agricultural tradition, and of investigating the possibilities of progress in it or of remedying departures therefrom.—*C. G. Trapnell.*

9035. TURRILL, W. B. Ecological isolation. *Bull. Miscell. Inform. Kew* 1938(9): 384-390. 1938.—The importance of studying the degree and kind of isolation in taxonomic studies is stressed. A group is a "better" species the greater its internal uniformity and the greater its isolation. A species is ecologically isolated when it lives under different conditions from its congeners. The different kinds of isolation (geographical, ecological, cytogenetic, physiological) often occur together, interact and tend to be cumulative. Examples of ecological isolation caused by climatic, edaphic and biotic factors are given. Turesson's work on ecotypes is briefly considered. The isolation of areas of similar ecological attributes is discussed and it is concluded that isolation gives a chance for divergent, convergent, or parallel evolution under similar but more or less isolated ecological conditions. A plea is entered for the intensive study of wild floras before man further destroys or modifies them.—*W. B. Turrill.*

9036. WAGENKNECHT, E. Untersuchungen über die

Vegetationsentwicklung nach Streunutzung in einem märkischen Kiefernrevier. *Zeitschr. Forst- u. Jagdw.* 71(2): 59-78. 2 fig. 1939.—Plant succession following litter removal in a pine forest was studied by analyzing the vegetative composition of sample quadrats on areas from which the litter was last removed at various times within the last 50 yrs. Of the 52 spp. found on 33 quadrats, only 5 were of major significance: *Calluna vulgaris*, *Hyppnum schreberi*, *H. cupressiforme*, *Dicranum scoparium*, and *D. undulatum*. *Calluna* is one of the first plants to occupy exposed mineral soil; it is followed or accompanied by *H. cupressiforme* and *D. scoparium*. *H. schreberi* does not appear in quantity until the heather has grown enough to produce shade. Unless the cover is disturbed, *H. schreberi* tends eventually to crowd out the heather, which reaches its maximum development in about 15 yrs. Practically the entire surface was revegetated within 10 yrs. after the litter was removed. On the poorer sites heather is less aggressive, and thrives only in openings; recovery of the soil cover is quicker if a heavy thinning is made when the litter is removed. *H. cupressiforme* and *D. scoparium* are more abundant than on the better sites. *D. undulatum* occupies an intermediate position with respect to site requirements. Few new spp. came in after 10 yrs. The number of spp. of flowering plants was much larger on the better than on the poor sites; there were more spp. of lichens (*Cladonia*) on the poor sites.—*W. N. Sparhawk.*

9037. WARREN, W. D. M. Erosion. *Indian Forester* 64(10): 622-624. 1938.—Most of the hill streams in forest areas descend at steep gradients,—which practically rules out gully plugging as an erosion control measure. Contour trenches, however, check the run-off and provide favorable soil conditions for heavier vegetation, and by their mechanical action soil losses are reduced to their minimum.—*J. N. Sen Gupta.*

9038. WEAVER, J. E., and F. W. ALBERTSON. Major changes in grassland as a result of continued drought. *Bot. Gaz.* 100(3): 576-591. 9 fig. 1939.—As a result of the great drought in Nebraska (1934-1937) many perennial grasses have decreased greatly in abundance. Little bluestem (*Andropogon scoparius*), formerly one of the most important dominants, has suffered great depletion, disappearing from some prairies. Bluegrass (*Poa pratensis*), big bluestem (*Andropogon furcatus*), and Indian grass (*Sorghastrum nutans*) have all become much less abundant on uplands. Certain shallowly rooted spp. of non-grasses or forbs have almost entirely disappeared, a few have greatly increased in numbers, but general losses have been approximated at $\frac{1}{2}$ - $\frac{3}{4}$. The annual *Festuca octoflora*, *Bromus secalinus*, and *Hordeum pusillum* were especially abundant during the early yrs. of drought but much less so during 1938. The scourge of the ruderal, *Lepidium virginicum*, so serious in 1936-37, has disappeared. Other annual weeds were extremely abundant in prairie only during 1 or 2 seasons. *Aster multiflorus*, a perennial with rhizomes, spread so widely in drought ravaged areas as to ruin many prairies for production of hay and resulted in breaking. *Erigeron ramosus* was almost equally widespread. Numerous forbs with fleshy storage organs—*Oxalis violacea*, *Allium mutabile*, *Tradescantia bracteata* et al.—increased remarkably in abundance. Western wheat grass (*Agropyron smithii*) occurred sparingly at the beginning of the drought but has spread so widely as to occupy $\frac{1}{2}$ - $\frac{3}{4}$ of many former bluestem prairies. Numerous native grasses and especially *Stipa spartea*, *Sporobolus heterolepis* and *Bouteloua curtipendula* have become far more abundant and important. The short grasses (*B. gracilis* and *Buchloe dactyloides*) have greatly increased. Drought has reduced the basal cover in true prairie 50-66%. The lower layer of grasses and forbs has been almost destroyed and grassland types have been much modified.—*J. E. Weaver.*

9039. ZOHARY, MICHAEL. Die Verbreitungsökologischen Verhältnisse der Pflanzen Palestinas. I. Die antitelechorischen Erscheinungen. *Beih. Bot. Centralbl. Abt. A.* 56(1): 1-155. 12 pl., 17 fig. 1937.—Climatic, phytogeographic and phytosociological relationships are presented briefly. The effect of rain, wind, topographic and biotic factors in relation to the dispersal of disseminules is discussed. Most of the disseminules of the plants of the region not only have no

adaptations for dispersal but even have characteristics which restrict dispersal, with which the present work is primarily concerned. Antitelechory may come about as a result of the reduction of the mechanism for dispersal in synaptospermy and heterocarp; by the formation of anchoring organs or means of anchorage in trypanocarp and myxospermy; by the manner of growth, mode of branching, etc., of the mother plant as in basicarp, ampicarp and basicarp; or by the retardation of dispersal in astatiphory and hygrochasy. Each of these phenomena is defined and plants of Palestine belonging to each group are listed. Salient points under each group are discussed, such as: ephemeral synaptospermy, the systematic-phylogenetic relationships of synaptosperms and of heterocarpous plants, and the geographical distribution of plants of these groups; morphological, physiological, and ecological differentiation of disseminules in heterocarpous plants; ecological relationships in the distribution of basicarpous and of hygrochastic plants; the biological significance of ampicarp and of slime secretion in myxosperms; and other features in the various groups.—*H. F. Bergman.*

OCEANOGRAPHY

9040. CLARKE, GEORGE L. The relation between diatoms and copepods as a factor in the productivity of the sea. *Quart. Rev. Biol.* 14(1): 60-64. 1939.—The traditional impression of copepod production is that it follows and is dependent upon the growth of diatoms. But others suggest that it is independent; and still others suggest that the population of the two in a given area is inversely related. Obviously the feeding habits of the copepods are the clue to the situation; and these are reviewed, without, however, a clear solution to the problem being yet obtainable.—*H. G. Swann.*

9041. WATERMAN, TALBOT H., RUDOLF F. NUNNE-MACHER, FENNER A. CHACE, Jr., and GEORGE L. CLARKE. Diurnal vertical migrations of deep-water plankton. *Biol. Bull.* 76(2): 256-279. 1939.—A study was made with the aid of closing nets of the diurnal vertical migrations of bathypelagic organisms at a station in continental slope water of the western N. Atlantic. While the hauls were being made a continuous record of the light intensity at the surface was kept. The penetration of light into the upper 84 m. was directly measured photometrically; the average extinction coefficient for green light was $k=0.092$. All of the malacostracan Crustacea (to which the detailed results presented in this paper are limited) which occurred in sufficient numbers for analysis exhibited diurnal migrations 200 to possibly 600 m. in vertical extent. The speed of vertical movement in these migrations varied from 24 to 125 m. per hr. among the various crustaceans. A considerable part of the migrations took place while the light intensity even at the surface was no greater than starlight. Several Crustacea living at 800 m. during the day showed extensive diurnal vertical migrations. It is concluded, however, that whether the migrations are regulated by external environmental or by internal physiological factors, at some time of day the organisms concerned are affected by light penetrating from the surface. Calculations made from the light penetration data indicate that the amount of light probably present during the middle of the day at the depths where the animals were migrating was adequate to support this conclusion.—*Auth. summ.*

LIMNOLOGY

(See also in this issue Entries 8991, 10091, 10571)

9042. HOWES, N. H. The ecology of a saline lagoon in Southeast Essex. *Jour. Linn Soc. [London] Zool.* 40: 383-445. 2 pl., 5 fig. 1938.—Chemical and physical factors together with the flora and fauna of a dammed creek in south-east Essex, England, are described. The creek had been completely isolated from river and sea for 9 yrs. and the salinity varied from 21.5‰ to 27.9‰. Monthly visits were made between Jan. 1934 and April 1935, when samples of flora, fauna and of the water were collected and the latter analysed. Results of detns. of the chemical constitution of the water, i.e., Na, K, Ca, Mg, Cl, SO₄, etc. are given and the annual cycles in salinity, pH, temp. and the content of Fe, excess base (Alkalinität), P₂O₅, SiO₂ and O₂ descr. An attempt to collect plankton quantitatively was made; results

obtained show that the productivity of zooplankton was much lower than in the sea. The floor of the creek was fairly uniformly covered with *Ruppia maritima* and *Chaetomorpha linum* was present in quantity during the summer. A list of 48 spp. of animals found is given. From the results of the analyses, the creek as an environment is discussed in relation to the physiology of its inhabitants.—*N. H. Howes.*

9043. HUMPHRIES, CARMEL F. The Chironomid fauna of the Grosser Plöner See, the relative density of its members and their emergence period. *Arch. Hydrobiol.* 33 (4): 535-584. 6 fig. 1938.—In a study primarily based on pupal exuviae made from March to Oct. 1936, 43 genera and 86 spp. were found living in the lake, of these 14 spp. are Tanypodinae, 24 spp. Orthocladinae, 29 spp. Chironomariae and 19 spp. Tanytarsariae. Comparison with the still waters of the Bavarian Alps indicates that in these alpine lakes the Tanypodinae are proportionably better represented, but otherwise the disposition of the groups is similar though only 14 spp. are common to the 2 lists. Comparison with observations made by Thienemann intermittently in 1917-1922 shows that 29 spp. occurred in this earlier period but not in 1936, while 41 spp. occurred in 1936 but not in the earlier period. The changes in composition were least noticeable in the Tanypodinae, most noticeable in the Tanytarsariae. Increasing eutrophy may be involved in the disappearance of forms such as *Monodiamesa bathyphila*, but it is difficult to assess variation due to differences in meteorological factors in different years. As indicated by pupal skins *Rheithocladus oblidens*, the larvae of which live in *Cladophora* and *Aegagropilus* is the commonest species, the supposedly characteristic deepwater *Chironomus anthracinus* (= *bathyphilus*) and *C. phumosus* being 5th and 17th respectively in the order of abundance. Detailed data on the period of emergence are given. The surface temp. appears to be important in regulating emergence, even in the deepwater forms not exposed to the great seasonal variations of the upper water. The incidence of spring and autumn turnover may well be of critical import in regulating the seasonal appearance of the adults. An intersex of *Einfeldia dissidens* parasitized by *Paramermis* sp. (?), and several undet'd. pupal skins are described.—*G. E. Hutchinson.*

9044. M'GONIGLE, R. H. Temperature characteristics for certain fresh waters. *Proc. Nova Scotian Inst. Sci.* 19(4): 428-438. 1937/38(1939).—Bodies of water can be readily compared insofar as temp. is concerned, and the suitability of any body of water for various aquicultural purposes can be readily detd. by fitting the "sine curve" to temp. observations. Ponderous masses of temp. readings, otherwise difficult to handle, are reduced and made easy of treatment (liquidated). A measure of that very important ecological factor, temp., is thus provided.—*Auth. abst.*

9045. PROTIC, GEORG. Hydrobiologische Studien an alkalischen Gewässern der Donaubauchschaff Jugoslawiens. *Arch. Hydrobiol.* 29(1): 157-174. 1935.—Six ponds were studied, all but one (Palicer, depth 8 m., area 576 hectares), under 2 m. in depth and under 100 ha. in area. Very curious chemical analyses of Palicer and Rusanda Ponds are given, in the case of the former entries for Aluminum hypophosphate and Silicium carbonate (sic) being made. All are clearly rich in sodium chloride, carbonate and probably sulphate, phosphate appears to be high, Li may be present. 21 spp. of diatoms, the dinoflagellates *Peridinium trochoideum* and *Euxiella laevis*, the copepods *Laophante mohammed* and *Eurytemora affinis* and the rotifer *Brachionus mülleri* are considered as probably relicts of an inland sea; transport by birds is, however, not excluded. The 3 halophil animals mentioned occur together only in Rusanda (org. matter 2.38 g. per l., NaCl 1.893 g. per l., Na₂CO₃ 1.976 g. per l., Na₂SO₄ 1.88 g. per l.) in company with a much more abundant fresh-water plankton, the dominants being *Diaptomus vulgaris*, *D. castor* and *Daphnia longispina*, with 13 other fresh-water entomostraca and 6 fresh-water rotifers. Palicer (NaCl 3.1156 g. per l., Na₂CO₃ 1.2283 g. per l.) has a similar fresh-water association with *Diaptomus vulgaris* and *Daphnia longispina* dominant, but with only *Eurytemora* among the halophil forms. Comparable zooplankton without any halophil elements was found in 2 unanalyzed ponds; phytoplankton, except *Scenedesmus* in Palicer, was almost absent; but in 2 other unanalyzed ponds,

Cyanophyceae and diatoms were very abundant, including the halophil members of the latter group. In these 2 ponds, a poor and purely fresh-water plankton, not qualitatively different from that in the preceding ponds, was found.—*G. E. Hutchinson.*

9046. RÜSCHE, ERICH. Hydrobiologische Untersuchungen an niederrheinischen Gewässern. X. Nahrungsaufnahme und Nahrungsauswertung bei *Plumatella fungosa* (Pallas). *Arch. Hydrobiol.* 33(2): 271-293. 2 fig. 1938.—All particles if not too large are taken with little selection. The mean time of sojourn of food in the gut is 90 min. Trachelomonads, *Euglena acus*, *Phacus caudata* and *Lepocinctis* spp. pass through unharmed; *Eudorina elegans*, *Pandorina morum* and green algae with coarse cell-walls are not digested. Diatoms, *Chlamydomonas* and rotifers (but not their eggs or loricae) are digested. The polyzoan is most abundant on water lily stems in the upper and middle water where there is most plankton. Studies of faecal pellets show that the *Euglena acus* of 1 cc. of water are removed in 41 hrs. by a single polyp, the *Trachelomonas* in 5.9 hrs., the rotifers in 4.8 hrs. Undigested algae, being embedded in the pellets, fall into the tropholytic zone and become available to Cladocera, particularly *Bosmina longirostris*. Chironomid larvae live on the polyzoa in numbers; as the bottom of the pond is practically sterile these larvae are an important source of fish food. *Fulica atra* and *Gallinula chloropus* feed on the *Plumatella*. Removal of detritus by the latter purifies the water.—*G. E. Hutchinson.*

9047. TORKA, V. Diatomeen aufwuchs von *Potamogeton nitens* Web. *Arch. Hydrobiol.* 29(1): 121-129. 3 fig. 1935.—Material from 3 German lakes (Paklitzsee, Tegelersee, and Röthensee) contained 63 spp., Benthic mud living forms, plankton forms, the members of the genera comprising large spp., and except *Navicula scutelloides*, the members of *N. punctatae*, are rare or absent. *Epithemia* spp. and *Cocconeis placentula* are well represented. Some of the less common spp., including *Caloneis potamea** are regularly encountered in the bioocenosis.—*G. E. Hutchinson.*

9048. WERNER, R. A. Uebersicht über die derzeitige bekannte Kryptogamenflora Marokkos mit besonderer Berücksichtigung einiger interessanter Disjunktelemente. *Veröffentl. Geobot. Forschungsinst. Rübel.* 14: 217-221. 1939.—The Moroccan cryptogam flora demonstrates a decided Mediterranean character with a great number of spp. belonging to a somewhat cooler climate. There is also an interesting element of tropical disjuncts, especially among lichens. Most of them belong to the W. African tropics, but many are Central American or have at least their nearest relatives there. There is another Eurasian-American element that is not decidedly tropical, some species with intermediate stations in Himalaya. Along the W. coast is found an interesting element of oceanic spp. The marine algal flora is of the Hispano-Canryan type with many tropical spp. and lacking a great number of the temperate ones. The freshwater algal flora seems to be decidedly European.—*K. Faegri.*

9049. WIEMANN, REINHOLD. Hydrobiologische Untersuchungen an niederrheinischen Gewässern. IX. Über die Bedeutung von Abwasser und Grundwasser bei Massenfaltungen von Plankton, insbesondere von *Chlamydomonas pomiformis*, in den Niepkühlen. *Arch. Hydrobiol.* 33(2): 257-270. 1938.—An immense local development at the lower end of a chain of ponds, dilatations of the R. Kendel, is traced to a tributary stream. This stream is strongly contaminated, and in its upper reaches is low in O_2 , high in P, bicarbonate, chloride, and ammonia. Some P is lost by precipitation as Fe is oxidized lower in the stream. There is some dilution by ground water, which raises the nitrate content above that due to nitrification. The resulting self-purified water is much richer in nutrients than the pond. A localized algal bloom is consequently produced with its maximum development opposite the entrance of the stream, but detectible over half the area of the pond. On Aug. 26, 1937, over 100,000 *C. pomiformis* per cc. were present. Some of the zooplankton tend to be similarly distributed. Faunistic and floristic notes on various parts of the system are given.—*G. E. Hutchinson.*

WILDLIFE MANAGEMENT—AQUATIC

(See also the section "Pisces"; and Entries 10032, 10033, 10036, 10040, 10052, 10055, 10056, 10496, 10560, 10620)

9050. CLARK, FRANCES N. Measures of abundance of the sardine, *Sardinops caerulea*, in California waters. *Div. Fish and Game California Fish Bull.* 53. 3-37. 2 maps. 1939.—The paper attacks the problem from various points of approach, calls attention to 4 measures that point to a decrease in abundance of sardines in area studied, and concludes that "the present intense fishing is placing a severe strain on a badly decimated population and making correspondingly difficult the restoration of that population to anything like its former magnitude. An immediate curtailment of the total catch would more quickly assure a restoration than would the postponement of that curtailment until the population is so depleted that it is no longer profitable to carry on the industry."—*H. W. Clark.*

9051. ESCHMEYER, R. WILLIAM. Analysis of the complete fish population from Howe Lake, Crawford County, Michigan. *Papers Michigan Acad. Sci., Arts and Lett.* 24 (2): 117-137. 1938(1939).—The fish population of a 13.4 acre northern Michigan lake comprised 23,528 individuals having a total wt. of 509.4 lbs. Spp. commonly represented were *Catostomus c. commersonnii*, *Cyprinus carpio*, *Hybomachus notatus*, *Eupomotis gibbosus*, *Aplites salmoides*, *Perca flavescens* and *Boleosoma nigrum*. Cannibalism in the bass was prominent; the largest young-of-the-yr. weighed 49 times the wt. of the avg. young early in Sept. when the fish were examined. Adult bass, with one exception, had grown slowly during their 1st yr. of life. The evidence suggested a close correlation between rapid growth and early mortality. The ratio of young bass to adults was 145:1; for perch this ratio was 158:1. The abundance of sunfish could be controlled by destroying the spawning beds.—*R. W. Eschmeyer.*

9052. FONTAINE, MAURICE. La lamproie marine, sa pêche et son importance économique. *Soc. Océanog. France Bull.* 18(97): 1681-1687. 5 fig. 1938.—The newly hatched larva or "ammocète" resembles a worm more than a fish and passes the first years of its life buried in the mud. At the end of 3 or 4 years, it undergoes in a few weeks a rapid metamorphosis and begins the feeding habits of the adult. Lampreys are fished by 4 principal types of gear: "the dog," a pair of large wooden pincers with the jaws lined with nails; a dip net 1.5-1.8 m. in diam., called a "sauce pan"; a water wheel rotating a series of flat nets which dip the lampreys into a bin; and fyke traps made of reeds, usually baited by placing a sexually ripe ♂ in them, which will attract up to 30 ♀♀ into the trap by the following day (consequently early in the season such ♂♂ are valuable).—*J. A. Aplin.*

9053. FREY, DAVID G., and HUBERT PEDRACINE. Growth of the buffalo in Wisconsin lakes and streams. *Trans. Wisconsin Acad. Sci., Arts and Lett.* 31: 513-525. 7 fig. 1938.—The growth of the buffalo fish during the first 2 yrs. was nearly the same, 116 and 120 mm. respectively, and after that it declined gradually and regularly. The growth rates of buffalo fish from different bodies of water were remarkably similar, but there was some indication that those living in running water grew more slowly in length and in wt. with relation to length than those in standing water. There was fairly good evidence that the buffalo fish ran in cycles, with good seasons every 3d yr.—*Auth. summ.*

9054. HARTLEY, G. W. Salmon caught in the sea—West Sutherland, 1937. *Fisheries, Scotland, Salmon Fish.* 2. 1-21. 4 fig. 1938.—Data were analyzed from salmon and grilse netted on the west coast of Scotland in 1937 for tagging purposes. The migrations of the fish tagged are considered in a separate paper [see in this issue entry 9057]. 324 grilse and 124 salmon provided the data for this work. The fish are classified into various age groups. The age groups are compared with age groups of a similar experiment in the previous year. Grilse formed 72.4% of the catch. The ages of the fish when they migrated as smolts were determined and are compared with similar data of the previous year. Average weights and lengths of salmon and grilse in 1936 and 1937 are compared. The condition factor of grilse is considered in detail. The average grilse con-

dition factor for the season was 1.18. Scales were measured, and the average calculated lengths at the end of each winter of river and sea life are recorded for the various groups. Growth increments, as determined from scale measurements, are recorded, and show the growth rate to be irregular. The occurrence of marginal checks was noted, especially among grilse. The percentage of grilse bearing marginal checks and the period of capture is shown. Eight fish among the 448 captured showed scale erosion.—*Z. E. Parkhurst.*

9055. **LOOSANOFF, VICTOR L.** Effect of temperature upon shell movements of clams, *Venus mercenaria* (L.). *Biol. Bull.* 76(2): 171-182. 1 fig. 1939.—Analysis of 399 daily records of shell activities of 47 clams, kept in large outdoor tide-filled tanks and subjected to temps. ranging from -1.0 to 28.0°C , showed that the length of time which the animals remain open partly depends upon the temp. of surrounding water. Majority of clams entered into hibernating stage at a temp. of about 5°C but a few animals remained active even at lower temp. Within the temp. range of 3.9 – 10.9°C , the average period of openness increased from 4 to 88% of total time, thus showing a correlation with the rise of temp. However, no such correlation could be found with the further increase in temp. ranging from 11 to 27.9°C . Within this temp. range the shells were open from 69 to 90% of the total time, but the percentage did not increase simultaneously with the increase of water temp. The highest percentage of time open was recorded at 21 – 22°C , when the clams remained open 90% of the total time, or 21 hrs. and 36 min. per 24-hour period. Small changes in the temp. of the surrounding water did not influence the shell movements of clams. There appeared to be no definite periodicity in the clam shell movements. The animals were closed for somewhat longer periods in daytime than in darkness.—*V. L. Loosanoff.*

9056. **MACFARLANE, P. R. C.** Salmon of the upper Solway district 1934. *Fisheries, Scotland, Salmon Fish.* 3. 1-18. 1938.—A scale sample was obtained from 1,890 salmon and grilse taken throughout the fishing season of the year 1934. The sample was divided into the various age groups and smolt ages. The scale sample was correlated with the percentage figures of the total commercial catch in each month in the area under investigation. Grilse and small summer fish together comprised three-quarters of the total catch, while spring fish formed only one-fifth. Among the summer-running fish there was a greater concentration into a shorter period of the grilse run than that of the small summer fish. In the spring groups, the 3 winters fish ran earlier than those of one year less sea-feeding. The proportion of previously spawned fish was only 1.1%. The age at which the fish migrated as smolts was determined; 87.6% migrated as two-year-old smolts. Smolt age at migration varies directly with the latitude, there being a steadily increasing proportion of the younger smolts towards the south. The average weight, length, and condition factor of each age group in each month throughout the fishing season was detd. Summer fish were in better condition than spring fish, and condition improved within each age group as the season advanced. The lengths attained at the end of each previous year of river and sea life were calculated from scale measurements, and average figures thus obtained for each age group and smolt age. Older smolts developed from shorter parr, but they ultimately attained a greater size than those which migrated at a lesser age. The calculated smolt lengths were the largest encountered in the Scottish investigations. Previous work indicates that available food supply plays a major part in determining the size at which smolts migrate. In common with other west coast investigations, the calculated lengths at the end of the first year of sea life were greater than those found on the east coast, which indicates that fish of the 2 coasts frequent different marine feeding grounds. The amount of rapid growth made in the sea by grilse and small summer fish in each month from the end of the previous slow growth period showed a steadily increasing progression up to the end of the season. Scale erosion was exhibited only by fish in the latter part of each run, and then only in minor degree.—*Z. E. Parkhurst.*

9057. **MENZIES, W. J. M.** The movements of salmon marked in the sea. II. The west coast of Sutherland in 1937. *Fisheries, Scotland, Salmon Fish.* 1. 1-9. 1938.—

This work corroborates a similar previous experiment that the movements of salmon during the period of recapture were definite migrations back to the rivers where they were hatched. In 1937, 448 fish were marked on the north-west coast of Scotland. 58 fish (13%) were recaptured, the majority being taken on the N and E coasts. Fish taken in or close to various rivers had scales, the parr area of which was recognizable as typical of fish of the respective areas of recapture. Fish making the longer migrations tended to travel faster, although the rate was not regarded as accurate because there was no data as to the actual course of migration, or the time spent at the place of tagging and in the region of destination before recapture. A general rate of between 15 and 25 miles per day was indicated. Norwegian, Scottish, and American types of tags were employed. The Norwegian type had the largest percentage recaptured, but it was employed during that portion of the season when recaptures were most numerous. The small number of fish did not allow definite conclusions to be drawn as to the efficiency of the several types of tags.—*Z. E. Parkhurst.*

9058. **MENZIES, W. J. M.** The movements of salmon marked in the sea. III. The Island of Soay and Ardnurchan in 1938. *Fisheries, Scotland, Salmon Fish.* 7. 1-9. 4 fig. 1938.—An analysis of the migrations of adult salmon and grilse. 94 adult salmon were tagged in the year 1938 at the Island of Soay, off the west coast of Scotland. 280 grilse were tagged at Fasdale, a point on the mainland. 22 (23%) returns were obtained from the Soay expt. and 35 (12.5%) returns from the Fasdale station. Equal numbers of Scottish and Norwegian type tags were used, as well as a limited number of American strap tags. No appreciable difference occurred in the number of recoveries of the Scottish and Norwegian type tags, but the American tags were less successful. The Soay fish (adults) were retaken chiefly on the north and east coasts. The proportion of Soay fish which left the west coast was as high as the proportion from a tagging station more than 100 miles farther north in a previous year. The Fasdale fish (grilse) were retaken within a radius of 30 or 40 miles from the tagging location, although 3 were recaptured in Ireland, 1 in Wales, and 4 on the east coast of Scotland. No grilse were recaptured on the north coast. It is suggested that migrations to the north and east coasts from the vicinity of the tagging localities may be made on the west side of the Outer Hebrides as well as by the Minch.—*Z. E. Parkhurst.*

9059. **NALL, G. HERBERT.** Sea trout of the River Carron and Loch Doule (Dhughail), Western Ross-shire. With an appendix on salmon from the same river, by P. R. C. MACFARLANE. *Fisheries, Scotland, Salmon Fish.* 4. 1-42. 6 pl. 1938.—The data were obtained from scales and measurements of 1,811 sea-trout and 123 salmon from Loch Doule and the River Carron on the northwest coast of Scotland. Size and age at previous stages of the life history were calculated from scale measurements. Condition factors and average weights at various periods are considered. 62.7% of the sea-trout migrated as 3-year-old smolts. Rivers in northern Scotland are cold and usually supply less food for fry, which in general results in a longer time spent in fresh water as parr and a lesser average length at the time of migration as smolts than is the case in the rivers of southern Scotland. In any one river there is a tendency for the slower growing, older, and larger smolts to mature in an earlier post-migration winter than the faster growing, younger, and smaller smolts. Maturity is attained at an earlier age in southern rivers. 2% of the sea-trout spawned in the 1st winter after migration; 61.4% first spawned in the 2d winter after migration, and 34.4% in the 3d winter. Two-fifths of the collection had spawning marks on their scales; 19 had 6 such marks, 9 had 7, 6 had 8, 1 had 9, and 1 had 11 spawning marks. The 4 heaviest clean fish weighed 14 lb., 13½ lb., 11½ lb., and 11 lb. The heaviest kelt weighed 9½ and 9¼ lb. The oldest fish was in its 16th year since hatching; the next oldest was one of 15 years (kelt), one of 14½ years and one of 14 years (kelt). Of the 123 sets of salmon scales examined, 60.2% migrated as 2-year-old smolts, and 39.8% migrated as 3-year-old smolts. This high average age at migration is characteristic of the salmon in northwestern Scotland. A

tendency is noted among salmon for the grilse, i.e., the fish which will mature in the 2d post-migration winter, to be shorter at the end of the 1st sea year than the salmon, i.e., the fish which will not mature till the 3d or later winter after migration.—Z. E. Parkhurst.

9060. RODEHEFFER, IMMANUEL A. Experiments in the use of brush shelters by fish in Michigan lakes. *Papers Michigan Acad. Sci., Arts and Lett.* 24(2): 183-193. 1938 (1939).—Brush piles designed as fish shelters were placed in 6 Michigan lakes to determine to what extent they are used by fish and what size and species of game fish are found in them. At intervals during the summer a large seine was laid around them to form a semicircle with the open part toward shore. Shelters were then pulled shoreward and the net was carefully drawn along behind. Fish captured were counted, measured, identified and fin-clipped, after which they were returned to the lake. Control areas were seined to note what number and spp. of fish lived in the open areas. The results of seining 62 shelter areas and 47 control areas indicate quite definitely that the young of the game fish, rock bass (*Ambloplites rupestris*), perch (*Perca flavescens*), pumpkinseed sunfish (*Eupomotis gibbosus*) and small-mouthed bass (*Micropterus dolomieu*), seek the protection of shelters. Of the forage fish, the bluntnosed minnow (*Hyboryhnchus notatus*) shows a decided preference for such protection. This study merely indicates the effectiveness in concentrating fish in a given area in a lake.—I. A. Rodeheffer.

9061. VAN OOSTEN, JOHN. The age, growth, sexual maturity, and sex ratio of the common whitefish, *Coregonus clupeaformis* (Mitchill), of Lake Huron. *Papers Michigan Acad. Sci., Arts and Lett.* 24(2): 195-221. 3 fig. 1938 (1939).—The combined samples collected July 3 and 10, 1923, were composed of fish of age groups III-VII, age group IV (1919 year class) predominating. The average standard length was 19.7 in. total length. The samples collected on Nov. 15, 17, and 19, 1924, were composed of age groups III-XII, age group VI (1918 year class) predominating. The average length was 23 in. Each year class was exposed to intensive gill-net fishing during 2 successive summers and 2 consecutive autumns. Growth in length was the same for the sexes although the ♀♀ tended to be heavier than the ♂♂ at corresponding lengths and ages. The whitefish grew 4.5 to 5.5 in. total length during the 1st yr., the yr. of most rapid growth, and in the 8th yr. at a length of 24 in. and a wt. of 4.7 pounds were still growing rapidly in wt. Growth compensation was found. A curve of length-wt. and standard length-total length relationship was shown. Standard length-total length ratios increased with an increase in length of fish. No correlation existed between the coefficient of condition, *K*, and growth rate. The *K* values averaged higher in ♀♀ than in ♂♂ and in summer than in fall. ♂♂ reached sexual maturity in their 5th yr. at a length of about 19.3 in. and a wt. of about 2.4 lbs., ♀♀ in their 7th yr. at a length of 22.1 in. and a wt. of 3.8 lbs. The sex ratio was 50:50 although the ♂♂ tended to become less numerous than the ♀♀ with age. ♂♂ preceded the ♀♀ on the spawning grounds.—J. Van Oosten.

9062. WATANABE, M., and J. L. HART. Sex ratio among pilchards on the Pacific Coast of North America. *Bull. Jap. Soc. Sci. Fish.* 6(5): 237-239. 1938.—Tagging expts. demonstrate the movement of pilchards between Canadian and southern California waters. There is an annual northward migration in the spring and southward migration in the fall. Larger pilchard migrate farther northward, thus the variation in size increment of large fish of British Columbia and small immature fish off southern California. Sex ratios taken at San Pedro indicate 51.7% ♀♀, Monterey 51.6% ♀♀, and Vancouver Island 55.7% ♀♀. Females are larger than the ♂♂ in all localities. An excess of ♀♀ among the larger fish suggests a differential mortality with a higher rate for ♂♂.—S. J. Hutchinson.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 10288, 10434)

9063. BASS, CHARLES C. Control of "nose-picking" form of cannibalism in young closely confined quail fed raw meat. *Proc. Soc. Exp. Biol. and Med.* 40(3): 488-489. 1939.—When young quail are kept crowded together in

small brooder pens, they develop the "nose-picking" form of cannibalism during the 2d to the 6th or 7th wk. It occurs when the birds are fed any one of several different commercial bird or poultry feeds or other feed mixtures. If, in addition to their other feed, they are given all the raw meat they will eat and a plentiful supply is kept before them all the time, "nose-picking" does not occur, or, if it has already started, it soon stops.—C. C. Bass.

9064. COTTAM, CLARENCE, and PHOEBE KNAPPEN. Food of some uncommon North American birds. *Auk* 56 (2): 138-169. 1939.—The records of stomach contents of some 239 birds of 47 rare, uncommon, or extinct spp. of N. American birds are summarized and discussed with suitable references to the literature. The following spp. are treated: *Gavia adamsi*, *Colymbus dominicus brachypterus*, *Diomedea nigripes*, *Puffinus tenuirostris*, *P. creatopus*, *Ardea occidentalis*, *Ajaja ajaja*, *Cygnus buccinator*, *Branta leucopsis*, *Philacte canagica*, *Anser brachyrhynchus*, *Mareca penelope*, *Nettion crecca*, *Rostrhamus sociabilis plumbeus*, *Buteo brachyurus*, *B. albicaudatus hypospodius*, *Urubitinga a. anthracina*, *Haliaeetus albicilla*, *Falco peregrinus pealei*, *Ortalis v. vetula*, *Colinus ridgwayi*, *Vanellius vanellus*, *Phaeopus borealis*, *Aethia pygmaea*, *Columba leucocephala*, *Ectopistes migratorius*, *Leptotila fulviventris angelica*, *Conuropsis c. carolinensis*, *Rhynchopsitta pachyrhyncha*, *Cuculus optatus*, *Coccyzus minor maynardi*, *Nyctidromus albigollis merrilli*, *Eugenes fulgens*, *Lampornis clemenciae bessophilus*, *Hylocharis l. leucotis*, *Cyananthus latirostris*, *Trogon a. ambiguus*, *Campophilus principalis*, *Myiodinastes luteiventris swarthi*, *Myiarchus tuberculifer olivaceus*, *Empidonax fulvifrons pygmaeus*, *Xanthoeca luxuriosa glaucescens*, *Toxostoma longirostre sennetti*, *Sialia sialis fulva*, *Oenanthe o. oenanthe*, *Passerculus r. rostratus*, *Aimophila b. botteri*. All the material upon which this paper is based is on file in the Section of Food Habits of the U. S. Bureau of Biological Survey.—P. Knappen.

9065. COTTAM, CLARENCE. Food habits of North American diving ducks. *U. S. Dept. Agric. Tech. Bull.* 643. 1-139. 10 pl. 1939.—To return to a satisfactory abundance the duck population, which has decreased alarmingly in recent years, owing in part to drought, reclamation, and overshooting, it is necessary effectively to apply principles of conservation and restoration. To do this, a knowledge of the food requirements of the species is requisite. This bulletin treats of the food habits of the 22 N. American diving ducks (exclusive of mergansers), which may be roughly segregated as inland divers and sea ducks. It is based both on field studies and on the analyses in the Food Habits Laboratory of the Biol. Survey of the stomach contents (including both gizzard and gullet) of 6,665 adults and 141 juveniles. For each species there is a summary of distribution, habits, and status, along with detailed data on food preferences. Food percentages were computed by the volumetric method. The inland divers include the redhead, ringneck, canvasback, greater and lesser scaups, ruddy duck, and the masked duck. With the exception of the greater scaup, which consumes nearly equal proportions of plant and animal food, all are predominantly vegetarians, feeding on tubers, underground rootstalks, seeds, and green vegetative fibers of many aquatic and marsh plants. The sea ducks include the American and Barrow's goldeneyes, bufflehead, old squaw, and harlequin duck; the eiders—Steller's northern, American, Pacific, king, and spectacled—and the scoters—white-winged, surf, and American. All of these are predominantly animal feeders. For the inland divers, few plants appear to be of outstanding value as food. Most important are the submerged pondweeds (*Najasaceae*), wild celery (*Vallisneria spiralis*), musk grass (*Characeae*), watershield (*Brasenia schreberi*), wild rice (*Zizania aquatica*), bulrushes (*Scirpus*), and smartweeds (*Polygonum*). The most important animal foods are mollusks and insects—particularly caddis fly and midge larvae, water bugs, and water beetles. A section of the bulletin treats of methods of propagating desirable duck foods. For the sea ducks, mollusks (mostly pelecypods, especially *Mytilus edulis*) were the most important food for 8 species, crustaceans for 4, and insects for 2. Fishes are acceptable to all the spp. treated but were consumed in small numbers, and the kinds taken are rarely of com-

mercial or sporting importance. Within limits, availability is the most important factor governing food selection. When an acceptable food is found the adults often make their entire meal on a single or a related group of species. The young of most spp. fed principally upon animal foods, mainly insects, crustaceans, and small mollusks, although some juveniles showed a decided, though indiscriminate, preference for vegetable material.—*C. Cottam*.

9066. ERRINGTON, PAUL L. Foods of bob-white in Wisconsin. *Auk* 56(2): 170-173. 1939.—Bob-white (*Colinus virginianus*) food habits in north-central U. S. in the warmer months are illustrated by data from a series of 53 stomachs collected in southern Wisconsin between Apr. and Nov., 1930 and 1931. Seasonal changes in diet were closely associated with relative availability of food types, vegetable matter being taken in far greater quantities than animal except during early growth stages of the young birds.—*P. L. Errington*.

9067. GIRARD, G. L. Life history, habits, and food of the sage grouse (*Centrocercus urophasianus* Bonaparte). *Wyoming Univ. Publ.* 3(1/2): 1-56. 20 fig. 1937.—The sage grouse is found in only 8 states and is the leading game bird in Montana, Wyoming, Idaho, and Colorado. An investigation of its life history, habits, and food is reported, the details being given in tables.—*Courtesy Exp. Sta. Rec.*

9068. GRISCOM, LUDLOW. The ring-necked duck as a transient in the northeastern states. *Auk* 56(2): 134-137. 1939.—*Nyroca collaris*.

9069. McATEE, W. L. Wildlife of the Atlantic coast salt marshes. *U. S. Dept. Agric. Circ.* 520. 1-28. 6 pl., 10 fig. 1939.—This circular is revised from material previously distributed in mimeographed form for educational purposes, particularly in CCC camps engaged in conditioning areas as refuges for migratory waterfowl. It urges conservation standards and doing what is necessary but no more when readjusting wildlife and its environment. The gradual sinking of the Atlantic coast is favorable to the formation of salt marshes and provides conditions suitable for the zones

of vegetation, which are described. Individual accounts intended to facilitate recognition, and including matters of popular interest, are given for the common plants, birds, reptiles, fishes, and mammals of the salt marshes.—*W. L. McAtee*.

9070. MARTIN, A. C., and F. M. UHLER. Food of game ducks in the United States and Canada. *U. S. Dept. Agric. Tech. Bull.* 634. 1-156. 153 pl., 137 fig. 1939.—Designed to provide information helpful in the development or improvement of waterfowl habits and to reduce unnecessary expenditures on wasteful attempts to introduce plants into unsuitable environments, this bulletin is divided into 3 parts, each contributing practical information on an important phase of waterfowl-food production and use: Part 1, "Regional data on duck foods," includes tables of data on the principal foods in 8 regions of the U. S. and Canada. Within each region the figures on food use have been based on locality units (247 in all) graded according to their representation by duck stomachs. Part 2, "Principal duck foods: their identification, value, and range," treats descriptively more than 200 food items, in systematic order. The 123 text maps indicate the general known range of the plants and in many instances depict areas of greatest abundance, isolated occurrence, and districts of uncertain distribution. Part 3, "Propagation of waterfowl food plants and development of feeding grounds," presents practical suggestions on harvesting, storage, germination, shipment, and planting and treats in some detail the principal factors, favorable and otherwise, influencing growth.—*A. C. Martin*.

9071. PRELL, H. Skandinavische Wildrinder in historischer Zeit. *Zool. Anz.* 125(7/8): 203-208. 1939.—A statement was made by Adam von Bremen in 1076 that in Scandinavia wild game was so abundant that the people subsisted on it. The pertinent words in the original Latin are uri, bubali, and elaces, usually translated as oxen, buffalo, and elk. A. believes that uri really refers to the guillemot (*Uria*), elaces to the auk (*Alca*) and bubalus to another bird, the puffin.—*L. H. Hyman*.

BIOLOGICAL ABSTRACTS

Editor-in-Chief, JOHN E. FLYNN; Assistant Editor, JEAN MACCREIGHT

VOLUME 13

AUGUST-SEPTEMBER, 1939

Entries 10671-12460

NUMBER 7

GENERAL BIOLOGY

Editors: A. H. GRAVES, *Plant*; C. A. KOFOID, *Animal*

(See also in this issue Entries 10825, 10832, 11575, 11851, 11913, 11940, 12117, 12133, 12171, 12172, 12270, 12338)

PHILOSOPHY OF BIOLOGY

10671. FELLER, W. Die Grundlagen der Volterraschen Theorie des Kampfes ums Dasein in wahrscheinlichkeitstheoretischer Behandlung. *Acta Biotheoretica* 5(1): 11-40. 1939.—The effect of random fluctuations of events such as deaths, encounters etc. on the struggle for life is investigated. With restriction to the "actions non-héréditaires" the mathematical methods are developed, by which it is possible to calculate the probability distribution of the future states, the probability of an extinction of a species, etc. On account of random fluctuations, the average values of the actually observable sizes of populations differ from the corresponding values of Volterra's deterministic theory, even though essentially the same fundamental assumptions are made. This theoretical difference is, of course, practically negligible.—W. Feller.

10672. GOLDSTEIN, KURT. The organism. A holistic approach to biology derived from pathological data in man. With a foreword by K. S. LASHLEY. xviii+533p. American Book Co.: New York, 1939. Pr. \$4.—The study of patients with brain injuries, visual disorders, and aphasias has given rise to two divergent views. The one utilizes anatomic localization of mental activities and the reflex basis of behavior to posit a particularistic philosophy of psychology. The author, who had opportunity after the World War to investigate many cases of disturbed mentality due to physical injury in part, defends the holistic viewpoint which other studies of psychological processes, memory, perception, and intellectual capacity also support. Behavior is not the sum of isolated activities but is a unified activity of the organism as a whole. The function of any part is dependent in large measure upon the total setting in which it operates. The book is therefore of interest in all branches of natural science since it seeks to avoid the difficulties of both reflexology and vitalism. The several chapters deal with the determination of symptoms, characterization of performances, rules determining organismic life, observable phenomena; a critique of the reflex concept, the direction of the organism; the function of the nervous system as a foundation for a theory of the organism, modifications due to impairment; the nature of partitive processes, reflexes, instincts, and drives; the conception of the organism as a whole; characteristics of the organism in the light of the holistic approach such as anxiety, the unconscious and the conscious, organismic unity of body and mind, and preferred and ordered behavior; gestalt psychology; the nature of biological knowledge; the norm, health and disease, anomaly, heredity and breeding; the problem of organismic hierarchy; and biology and action. Bibliographies for each chapter are given.—C. A. Kofoid.

10673. HARRINGTON, MILTON. A biological approach to the problem of abnormal behavior. 459p. 6 fig. Science Press Printing Co.: Lancaster, 1938.—The purpose of this book is to present an alternative to psychoanalysis through a bio-mechanistic theory of behavior. Starting with the assumption that abnormal forms of behavior and mental ills occur because of the limitations and defects of the physiological organism, criticism is launched at the motivistic approach to both normal and abnormal behavior.

Based on the assumption that a true understanding of abnormal psychology must begin with the study of the normal, the author attempts to build a psychology of 3 parts: (1) Psychophysiology, (2) Psychopathology, (3) Psycho-orthology. This volume presents the first 2 parts. The first 4 chapters deal with concepts and methods and a brief history of "old" psychology. 17 chapters are devoted to psychophysiology, including the mechanisms and forms of behavior, types of stimulation, and the factors determining responses. Mental adjustment is considered as much a part of relief from tension as are the more overt forms of behavior. The tension mechanisms include those of pain, pleasure, anger, and mirth. Learning is considered a form of biological adaptation with the various phenomena of conditioning explained by a law of confluence. 11 chapters are given to psychopathology. These include a discussion of the causal factors of abnormal behavior, the nature and effects of non-adjustment and mal-adjustment. The book contains a good résumé, an adequate index, but few references.—B. von Haller Gilmer.

10674. LASSEN, HARALD. Leibniz'sche Gedanken in der Uexküll'schen Umweltlehre. *Acta Biotheoretica* 5(1): 41-50. 1939.—Giving the foundation of his doctrine of the "Umwelten," v. Uexküll considers Kant's idealism as the best starting point. The present essay, on the contrary, tries to demonstrate that the peculiarity of his problems rather corresponds to the logical and metaphysical position of Leibniz's "monadology" and so shares its philosophical profundity as well as its ontological difficulties.—H. Lassen.

10675. METALLMANN, JOACHIM. Der Kampf um die Autonomie des Lebens. *Acta Biotheoretica* 5(1): 1-10. 1939.—Mechanism includes 2 components, viz. the antiteleological attitude and the strictly mechanistic thesis. The evolution of this theory, however, shows that only the latter component is essential, as it has grown independent of the former. Vitalism contains, besides the untenable idea of entelechy, the fruitful concept of the autonomy of life. The contention then takes place to-day between two totally modified points of view, "machinism" and "autonomism," which are both theories of life, and not descriptions of pure facts, interpretations that transgress the experience.—J. Metallmann.

10676. RASHEVSKY, N. Some remarks on the mathematical biophysics of organic asymmetry. *Acta Biotheoretica* 4(3): 197-203. 4 fig. 1939.—The problem of asymmetric organic structures in general presents no particular difficulties for physical interpretation, but a difficulty arises when we try to explain the preponderance of one type of asymmetry. E.g., the position of the heart on the left side is enormously more frequent than the reverse one. This suggests some special asymmetric physical factors in the process of embryonic development. Two possibilities are discussed in this paper: one, considered biophysically rather unlikely, is based on the asymmetry of the electromagnetic field; the other, considered more plausible, is based on the asymmetric structure of organic molecules and on the resulting asymmetry in the diffusion fields of those molecules.—N. Rashevsky.

10677. ROSTAND, JEAN. La vie et ses problèmes. 211p. Flammarion: Paris, 1939. Pr. 17.50 fr.—This is a

popular theoretical discussion of life and its problems. The topics discussed include cellular structure; virus-proteins; reproduction; development; form and form control; organic coordination; culture of tissues and organs; regeneration; grafts; mitogenic rays; tropism, reflexes, and instincts; death, immortality of unicellular and multicellular organisms, longevity, senescence, rejuvenescence, length of life, and decline of mortality; determinism, mechanism and vitalism; evolution, Lamarckianism, mutations, Cuenot's views on coaptation, the origin and future of man, the origin of life, and life in the universe; and the place of man in the scheme of things. The author's point of view favors mechanism as against vitalism and vital phenomena as a category of the general problem of organization.—*C. A. Kofoid.*

MICROSCOPY, INSTRUMENTS, TECHNIQUE

10678. CLARK, WALTER. Photography by infrared. Its principles and applications. xi+397p. Frontispiece, 34 pl. John Wiley and Sons, Inc.: New York, 1939. Pr. \$5.—While written as a book on photography this inclusive monograph gives the theory and fundamentals of photography, of radiation physics and of illumination engineering. Sources of radiation sensitization and infrared sensitive photographic materials are covered historically and descriptively. The Herschel effect is considered with various methods for indirect infrared photography. Many dark materials and dark dyes photograph light with infrared radiation which facilitates their analysis and differentiation. Plants, plant lesions, fossils, the human venous system, textiles, and dyes have yielded new information by this means. Photomicrographs taken with infrared are useful in embryology, histology and pathology. Infrared photography is used in the analysis of oil paintings and in criminology. Its limitations in penetrating haze and fog are clearly stated. Some dark slides in plate holders are not opaque to infrared radiation. Tungsten light and sunlight are adequate sources for most work. A suitable filter and sensitive plates or films are all required for infrared photography in addition to a camera and the usual processing materials. Adequate details are given for the practical use of infrared photography.—*O. W. Richards.*

10679. FORBES, WM. T. M. Iridescence. *Ent. News* 50(2): 40-44; (4): 101-104. 1939.—Suggests a formula by which the best angles for lighting and viewing iridescent colors may be specified in terms of azimuth and vertical angle, and gives examples of its application, especially from the Nymphalidae (Lepidoptera). *Talanga sabacusalis, tolumnialis* and *seppunctalis* are recharacterized in terms of this formula.—*W. T. M. Forbes.*

TAXONOMY AND NOMENCLATURE

10680. CORSIN, P., et P. BERTRAND. Phylogénie des végétaux vasculaires Observations complémentaires. *Bull. Soc. Bot. France* 85(7/8): 503-504. 1938.—The authors state their belief in the conception of a single genealogical tree embracing all classes of vascular plants and issuing from plants analogous to the Rhyniales.—*E. L. Core.*

10681. REHDER, ALFRED. Proposed amendments to the International Rules of Botanical Nomenclature. *Jour. Arnold Arboretum* 20(2): 269-279. 1939.—Changes in Art. 26, 49, 53, 69 and 70 and in Recommend. XI, XXXI and XLIII of the International Rules of Botanical Nomenclature are proposed.—*A. Rehder.*

10682. RILEY, N. D. When is a name a subspecific name? *Ent. News* 50(2): 31-33. 1939.—Discussion of paper by Hovanitz [see B. A. 12(8): entry 12616].

CONSERVATION AND NATURE STUDY

10683. CALVERT, W. R. Nature and the Rambler. With note-book sketches by L. R. BRIGHTWELL. 163p. 159fig. Thomas Nelson and Sons, Ltd.: London, 1939. Pr. 2s.—This very complete, popular account of the commoner mammals, birds, reptiles, amphibians, insects, and poisonous plants of the English countryside has special notes on changes from wet to dry seasons, meadow life, swallows, dragon-flies, sea-shore tide-pools, shore birds, life on the moors, wild fruits, migrant birds, autumnal excursions, birds' nests, and on keeping field notes of observations.—*C. A. Kofoid.*

10684. DUNCAN, CARL D., and GAYLE PICKWELL. The world of insects. x+409p. Col. frontispiece, 194 fig. McGraw-Hill Book Co.: New York, 1939. 'Pr.' \$3.50.—This non-technical account of the commoner insects, illustrated with numerous original photographs and diagrams, discusses the anatomical structures of insects, development and transformations, life history of the swallowtail butterfly, foods and feeding habits, special types of food-getting devices, reproduction, respiratory organs, locomotor systems, protective patterns and devices, stridulation, adaptive devices, ordinal characteristics, social life, values of insects to man, injurious insects and their control, rearing insects, and field collecting and preservation. The illustrations are new and cover a wide range of subjects. The treatment is such as to make the book a valuable work of reference for general use.—*C. A. Kofoid.*

10685. ROBERT, PAUL A. Alpine flowers. With introductory text by CARL SCHROETER. 11p. 36 col. pl. B. T. Batsford, Ltd.: London, 1939. Pr. 10s.—The botanical text accompanying these skillfully drawn color plates deals with the ecology of the Alpine flora presenting the distribution, habitats, and insect visitors of the 46 plants portrayed on the plates.—*C. A. Kofoid.*

10686. VERRILL, A. H. Strange animals and their stories. xvi+235p. 6 pl. (2 col.), 77 fig. L. C. Page and Co.: Boston, 1939. Pr. \$2.50.—This popular account of mammals is interesting because of their unusual characteristics or rarity. The subjects included are animals in armor or protected by spines; relic types, such as the duckbill, echidna, the marsupials, anteaters, and solenodon; sloths; the pig tribe; animal artisans, such as the mole, muskrat, beaver, and sewer; misfit animals of extremes in structure, such as the giraffe, gnu, okapi, hyrax, desman, and dormouse; animal juggernauts, the elephant, rhinoceros, tapirs, and hippos; marine mammals; the bear clan; dogs and their relatives; animal pests, including rabbits, squirrels, rats, mice, and wolverines; the big cats; flying mammals; camels of Eurasia and the Andes; and monkeys and gorillas. Anecdotes of mammalian behavior are interspersed with popular accounts of these various mammals in the wild and in captivity.—*C. A. Kofoid.*

TEXTS AND EDUCATION

10687. GODWIN, H. Plant biology. An outline of the principles underlying plant activity and structure. 3rd ed. rev. and enlarged. xii+308p. 83 fig. Cambridge University Press: Cambridge, 1939. Pr. \$2.25.—Since the 1st edition (1930) the English universities have standardized their biological instruction as to content. This edition meets this by the addition of sections on the fern, reproduction by flower and seed, and a fuller treatment of alternation of generations and reduction division. *Pythium*, *Pellia*, and *Sphaerella* are added to the lower types. Emphasis is given to physiology and the physico-chemical basis of plant life.—*C. A. Kofoid.*

10688. JOHNSON, E. R. FENIMORE. The preservation and abuses of motion picture film by scientific institutions. *Proc. Amer. Phil. Soc.* 81(1): 79-92. 1939.—The writer's findings as to what the present status of motion picture film is in scientific institutions are given, and there is speculation as to its future. There is a description of the best means of handling film in and about institutions and of the best storage conditions. Facts are stated which enable the reader to judge for himself the desirability of the various kinds of film as material for permanent records. The writer recommends 16 mm. cellulose acetate base film as the best at present available for this purpose. Steps other than correct storage which must be taken in order to assure permanent retention of valuable motion pictures are described. There is a list of necessary equipment, and the more important literature pertaining to the evaluation of motion picture film for permanent records and its proper care and storage is cited.—*Auth. abst.*

10689. LAMEERE, AUG. Précis de zoologie. Tome 6, fasc. 1. Les Protochordés. 116p. 117 fig. H. Cauwenberg: Bruxelles, 1939.—Continuation including a morphological and embryological discussion of the Cephalochorda and Tunicata.—*C. A. Kofoid.*

10690. MARSLAND, DOUGLAS, in collaboration with PAUL F. BRANDWEIN. Manual of biology. I. The Proto-

zoa and the plant. II. The metazoan animals. x+176p. 85 fig.; viii+211p. 82 fig. Henry Holt and Co.: New York, 1939. Pr. \$1.20 each.—These are laboratory guides for an elementary university course with instructions and questions for the pupil, suggested demonstrations for the instructor, lists of source of teaching materials, and lists of biological terms with their derivation and pronunciation. The topics included in Part I are the microscope, technique of drawing, cells, mitosis, meiosis, amoeba, *Paramecium*, flagellates, bacteria, *Oscillatoria*, *Spirogyra*, *Fucus*, yeasts, *Marchantia*, *Funaria*, fern, pine, Angiosperms, seeds and seedlings, and stems. Part II includes embryology, tissues, frogs, *Hydra*, *Obelia*, *Planaria*, *Cryptocotyle*, *Lumbricus*, *Mercenaria*, *Asterias*, *Homarus*, grasshopper, *Simulium*, and the rat.—C. A. Kofoid.

10691. MEICHE, E., and MARIE BARRETT. Characteristics and classification of animals. 2nd ed. 1 broadside. Turtox Co.: Chicago, 1938. Pr. \$.50.—A key to the phyla, classes, and orders of animals with examples of its use.—C. A. Kofoid.

MISCELLANEOUS

10692. HENDERSON, I. F., and W. D. HENDERSON. A dictionary of scientific terms. Pronunciation, derivation, and definition of terms in biology, botany, zoology, anatomy, cytology, embryology, physiology. 3rd ed. rev. by J. H. KENNETH. xii+383p. D. Van Nostrand Co., Inc.: New York, 1939. Pr. \$7.—For abstract of the 2d edition see B. A. 5: entry 22527. The present edition is considerably larger; some 10,000 terms are defined. The definition of technical terms has been kept thoroughly up-to-date—many terms of very recent origin being included.—J. E. F.

10693. ORTH, FRED W., and MARYLAND Van ARTS-DALEN. Queer farms by sixth grade boys and girls, Ascot Public School, Los Angeles. 140p. 39 fig. Ivan Deach, Jr.: Burbank, 1938. Pr. \$2.—This popular account of animal farms in southern California includes those for the commercial raising of alligators, ostriches, lions, earthworms, ladybird beetles, frogs, bees, parrots and cagebirds, rare imported birds and mammals, pheasants, foxes, goldfishes and tropical fishes, silver foxes, and Kellogg's Arabian horses. The cactus farm is also included. Bibliographies are given for each.—C. A. Kofoid.

10694. SLOOTEN, D. F. van (under direction of). Liste des familles et genres cultivés au Jardin Botanique. *Bull. Jard. Bot. [Buxtenzorg]* Ser. III, Suppl. Vol. I, Index. 309-325. 1938.

10695. TOLKOWSKY, S. Hesperides. A history of the culture and use of citrus fruits. xx+371p. 113 pl., 10 fig. John Bale, Sons and Curnow, Ltd.: London, 1938. Pr. 21s.—This is an authoritative, detailed and extensive study of

the historical evidence bearing on the introduction, cultivation, and use of citrus fruits in western civilization. The author is the first to make extensive use of the naturalistic art of the Hellenistic East, of Imperial Rome, of the Italian and French Renaissance, and of the Dutch and Flemish schools of nature painters in tracing the history of cultivated plants. These offer evidences both accurate and reliable of the types of citrus fruit known and valued in centers of culture over a long period of time. Extensive use has also been made of botanical and medical literature, of poetry, of folklore, and of religion. The ritual use of citron at the Feast of the Tabernacles can be dated as far back as 135 B.C. by the coins of Antiochus VI, who substituted citron for the cedar cone in the harvest festival. This substitution may have initiated the culture of citrus in Palestine. The center of origin of the genus *Citrus* is traced to the mountainous parts of southern China and northeastern India. Wild oranges, both sweet and sour, occur in Garhwal and Sikkim on the slopes of the Himalayas and in the Khasi hills in Assam. Wild citrons, lemons, and limes are found up to elevations of 4,000 feet in the same regions. *Citrus mazima*, the shaddock, the parent of the grapefruit occurs in the Malay Archipelago. "Mon-soonia" thus appears to have been the region in which the species of *Citrus* originated. The Chinese early regarded the citrus fruits as those of the mountain. The earliest record is in the *Book of History*, around 500 B.C., a collection of earlier documents of the 24th to the 8th century B.C. The author traces the acclimatization of citrus fruits in western Asia, northern Africa, and southern Europe by the Roman trade with southern India. Mosaics and frescoes record evidence that oranges and lemons were known in Italy before Pompeii was destroyed, that the citron and orange were cultivated, though apparently the orange did not flower or fruit, and that oranges, lemons, and limes were regarded as of Indian origin. Evidences are cited showing that references in Latin, Greek, and Hebrew hitherto regarded as applying only to the citron may apply also to other citrus fruits. The rise of Islam revived citriculture around the Mediterranean and the Renaissance accelerated it in Italy and Spain. From the latter country citrus fruits reached the Americas. The high favor in which citrus fruits were held in Europe is shown by the extensive orangeries constructed for their growth in the colder climates and by their repeated portrayal in still life works of art and as decorative motives. Statistical tables of present day production and consumption of citrus fruits are given and an extensive bibliography of original sources is added. The plates furnish an iconography of the use of citrus fruits in the arts and the text a record of their utilization in letters.—C. A. Kofoid.

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 10695, 12270)

HISTORY

10696. BLUMER, GEORGE. Some remarks on the early history of trichinosis (1822-1866). *Yale Jour. Biol. and Med.* 11(6): 581-588. 1939.—Trichinosis is probably a very old disease but this cannot be definitely proven from a study of the available literature. The encysted form of the *Trichinella spiralis* in human muscle was first described by Tiedemann in 1822, was seen by H. Peacock in 1830, and by John Hilton in 1833, the last named suggesting its parasitic nature. The worm was discovered by James Paget, then a medical student, in 1835. The first description of the worm, a somewhat erroneous one, was published by Richard Owen. Herbst, Virchow and Leuckart studied the worm experimentally and worked out its life history. Joseph Leidy, of Philadelphia, was the first to recognize the parasite in the flesh of the hog in 1846. 38 yrs. after the discovery of the encysted larva Zenker, in 1880, showed that the worm was capable of causing disease and described the clinical picture and pathological lesions.—G. Blumer.

10697. BURKE, RICHARD M. A historical chronology of tuberculosis. viii+84p. Charles C. Thomas: Springfield,

Illinois, 1938. Pr. \$1.50.—The author has attempted to recount in the shortest possible manner, using telegraphic style, the essential steps that have led to the present knowledge of tuberculosis. Starting around 5000 B.C. and ending with 1937 the "pertinent records of individuals, discoveries and events contributing most greatly to the story of tuberculosis" are chronologically enumerated in 60 pages in small format. Such brevity has necessitated rigorous differentiation between fundamental and incidental data. The centuries up to and including the discovery of the tubercle bacillus stand out in clear historical perspective due to the sifting work of Waldenburg, Predöhl, Neuburger, Pagel, Garrison, Webb and many other authors who have analyzed specific fields in the history of tuberculosis, and due eminently to the fact that the passage of time has shown which building stones were basically important and which were not. For the contemporary period, selection becomes mainly a matter of individual judgment, and the author's judgment may be questioned. In its present form its real value is for one, basically familiar with the subject, who wants to recall the exact date of a given fact or

refresh his memory on some sequence of events. The extreme conciseness of this book is its greatest virtue.—*From review by M. Pinner (courtesy Amer. Rev. of Tuberc.).*

10698. TAYLOR, F. SHERWOOD. *The march of mind. A short history of science.* xiv+320p. 14 pl., 36 fig. Macmillan Co.: New York, 1939. Pr. \$3.—This book (published in England as *A Short History of Science*) is a very complete outline of the history of the natural and physical sciences from their beginnings in Sumeria and Egypt to their latest developments in the twentieth century. The emphasis is upon the state of science as a whole in each of the periods covered, the individual sciences being subordinated. The scope of the work can be indicated by the titles of the chapters with the number of pages assigned to each: I The beginnings of science, 17pp.; II The science of Greece, 50pp.; III Eastern and Arabic science, 17pp.; IV Medieval science, 33pp.; V Science in the Renaissance, 14pp.; VI The rise of modern science, 99pp.; VII The age of science, 82pp. There is no bibliography and the reference citations are incomplete. The index is adequate.—*C. Zirkle.*

BIOGRAPHY

10699. BERTRAND, GABRIEL. A. Fernbach, 1860-1939. *Ann. Ferment. [Paris]* 5(2): 65-73. 1939.—A short resumé of Fernbach's studies on sucrose, malt extracts, phosphate and diastase, buffers (he originated the name "tampon" [buffer] to describe the effects of phosphates in the media in 1900), and fermentation is followed by a list of his scientific papers (75) from 1880 to 1928.—*M. A. Amerine.*

10700. GERTZ, OTTO. Alexis Eduard Lindblom. *Botaniska Notiser grundare och förste utgivare. Minnes-teckning. [Alexis Eduard Lindblom, founder and first editor of Botaniska Notiser. Memory sketch.] Bot. Notiser* 1939(2): 273-290. 1939.—In honor of the hundredth anniversary of Botaniska Notiser a life history of the

founder and first editor of this journal has been included with a bibliography.—*T. R. Swanback.*

10701. NEGRI, GIOVANNI. Pietro Romualdo Piroto: *In memoriam. Nuovo Gior. Bot. Ital.* 45(4): 629-638. 1938 (1939).—Biography of the distinguished professor of botany at the Royal University of Rome, director of the Colonial Herbarium, biographer of botanists, author of *Flora Romana*, *Flora of Eritrea*, etc.—*F. Ramaley.*

10702. REYNAUD-BEAUVERIE, MME. J. Beauverie. *Bull. Soc. Bot. France* 85(7/8): 557-567. 1 pl. 1938.—The biographical sketch reviews the interests and accomplishments of this versatile botanist, giving a brief resumé of his contributions to mycology, cytology and economic botany. It also stresses the importance of his influence in the promotion of research and the activities of scientific organizations and societies.—*P. D. Strausbaugh.*

10703. SHULL, CHARLES A., and J. FISHER STANFIELD. Thomas Andrew Knight, in memoriam. *Plant Physiol.* 14(1): 1-8. 1 pl. 1939.—An appreciation, with quotations from Knight's contributions, and a brief biography, in commemoration of the one hundredth anniversary of his death, May 11, 1838-1938.—*C. A. Shull.*

10704. ANONYMOUS. L'Oeuvre scientifique de M. Schoen. *Ann. Ferment. [Paris]* 5(1): 1-12. 1939.—A review of the exptl. work done by Schoen at the Pasteur Institute in Paris on proteolytic diastases, hydrolysis of starch, production of pyruvic acid during alcoholic fermentation, biological production of butyl alcohol and acetone, fermentation of sugars in various media, hydrolysis and fermentation of cellulose, and the mechanism of fermentation, etc. A list of his exptl. papers, reviews, and monographs is given.—*M. A. Amerine.*

10705. ANONYMOUS. William Richard Tracey. *Canadian Publ. Health Jour.* 30(2): 110. 1939.—William Richard Tracey, since 1935 Chief of the Vital Statistics Branch, Bureau of Statistics, Dominion of Canada, died January 9, 1939, at the age of 53.—*H. R. Thornton.*

BIBLIOGRAPHY

Editors: CLARIBEL R. BARNETT AND EILEEN R. CUNNINGHAM

(See also in this issue Entries 10688, 10692)

10706. BORBÁSIA. Vol. 1, no. 1, February, 1938. Editor, V. KÓFARAGÓ-GYELNIK. Publ. by Typographia Rákóciana (A. Saphir), Budapest.—The following papers comprise the first issue: Die Gallen des St. Gellért Berges, by BALAS von SÍPEK; Additamenta ad cognitionem Phytosarcodinarum Hungariae, by J. BANHEGYI; Terem e *Cotoneaster integerrima* az Ósmátrában, by J. DOMOKOS; Beobachtungen an *Dianthus* in Siebenbürgen, by Z. KARPATI; Beköszöntő, by V. KÓFARAGÓ-GYELNIK; Two new New Zealand Nephromas, by V. KÓFARAGÓ-GYELNIK; Cladoniae novae e Hungaria, by Ö. SZATALA; Über das Vorkommen von *Anacamptodon splachnoides* (Fröl.) Brid. in Ungarn, by J. SZEPESFALVI; Nouvelle interpretation systématique du *Rhus palaeocinus*, by J. UDVARHAZI.

10707. LANCASTER-JONES, E. Evaluation of scientific and technical periodicals. *Assn. of Special Libraries and Information Bureaus, Proc.* 15: 72-83. 1938.—A discussion of various methods of periodical evaluation. Cites difficulty of interpreting results which are frequently not comparable with each other due to differences in methods employed. States need for co-ordination of data and for having more frequent recourse to expert opinion than has been true in previous methods of evaluation. The compilation and co-ordination of data concerning evaluation of the entire output of current scientific and technical periodicals is a task of great magnitude but not beyond the capacity of a single center. The information available through such a center could serve as a basis for final

selection to meet individual institutional needs.—*E. R. Cunningham.*

10708. REHDER, ALFRED. Bibliographical note on "Ehrh. Plantag." *Jour. Arnold Arboretum* 20(1): 137. 1939.—The citation "Ehrh. Plantag." used by Ehrhart is shown to refer to the anonymous publication "Verzeichniss der Bäume und Sträucher welche sich auf der Königl. Plantage zu Herrenhausen bei Hannover befinden. 1787."—*A. Rehder.*

10709. SOULE, B. A. Library guide for the chemist. xiii+302p. 4 fig. McGraw-Hill Book Co.: New York, 1938.—This book is intended mainly as a guide to the use of keys and summaries. "In this respect it is unlike the few other books dealing with chemical literature because they are mainly concerned with the cataloging of source materials." The author begins with the arrangement of a library and its directories, emphasizing the problems of the chemist rather than those of the librarian. The 2d section deals with sources of bibliographical data, and is followed by a discussion of periodicals and original reports. Abstract journals and author and subject indexes are next taken up, then reviews, annual reports, encyclopedias, and dictionaries. Textbooks are dealt with in the groups inorganic, organic, analytical, and physical. Patents and government publications in general are also considered, and the final section treats of report writing and note filing. The book has a combined subject, title, and author index.—*Courtesy Exp. Sta. Rec.*

10710. ANONYMOUS. Bibliofilm service in geological survey. *Amer. Midland Nat.* 21(1): 258. 1939.

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. McCLUNG, *Animal*
(See also in this issue Entries 10702, 10725, 10730, 11789, 11912)

GENERAL

10711. BAUER, HANS. Neue Ergebnisse der Cyto-genetik. *Physik.-Med. Ges. Würzburg Ber.* 61: 70-81. 4 fig. 1937(1938).—A review.

PLANT

10712. ERLANDSSON, S. The chromosome numbers of some *Taraxacum* species. *Bot. Notiser* 1939(1): 261-264. 1 fig. 1939.—This is a report on chromosome numbers detd. for a few Arctic and Asiatic spp. of *Taraxacum*. For *T. officinale*, $2n=16$; corresponding numbers for other species examined formed the series 24, 32, 40 and 48.—T. R. Swanback.

10713. ERNST, HANS. Meiosis und Crossing over. Zytologische und genetische Untersuchungen an *Antirrhinum majus* L. *Zeitschr. Bot.* 33(6/7): 241-294. 1938.—Meiosis in certain types of *A. majus* was studied by a modified acetocarmine technique and the gentian violet smear method. The resting nucleus contains about 16 chromocentres, which during leptotene come to form the heterochromatic middle portions of the chromosomes. Pachytene analysis enables 4 chromosomes to be identified with special morphological characteristics. No good fixations of diplotene were obtained, but diakinesis figures admitted of a study of pairing relations in terms of the physiology of meiosis. The percentage of broken terminal connections in diakinesis in untreated pot or field plants was low (0.66-0.81%). Following upon alternating high- and low-temp. treatment, this figure rose to a maximum of 13.94%. The observed fall in connections corresponds in genetic expts. to a corresponding reduction of the cross-over value of the Aur-Marm-linkage, so that a fall in connections must result from a lowering of the chiasma frequency. The treatments used in this investigation lead in varying degrees to irregularities in meiosis and a consequent lowering of pollen fertility. Irregularities produced either by heat or cold include numerous occurrences of deficiencies, deletions, inversions and translocations similar to those caused by X-ray treatment. They were observed in pachytene and are the first chromosome mutations to be demonstrated in *Antirrhinum*.—J. H. Priestley.

10714. FRANCINI, ELEANORA. A proposito del potere cromotropo del nucleolo. [Color change (in stained material) produced by the nucleolus.] *Nuovo Gior. Bot. Ital.* 45(4): 558-566. 1938(1939).—Changes in color after staining of root tips of *Paphiopedalum spicerianum* with toluidin blue are noted, while anthers of *Nigella sativa* reported by Negodi as showing similar metachromatic effects after thionin staining need consideration. These either at once after mounting in balsam or else a few days later show the nucleolus red, the nuclear reticulum blue-violet, and cytoplasm pink-violet. Anther cells of *Paeonia moutan* soon have chromosomes and reticulum intense violet, cytoplasm pale violet, nucleolus vivid red, and cell-walls red. These color changes are not due to changes in pH of sections but rather to a sulphuric ester constituent of the mucilaginous material of the nucleus.—F. Ramaley.

10715. GILES, NORMAN. The effect of dehydration on microsporogenesis in *Tradescantia*. *Amer. Jour. Bot.* 26(5): 334-339. 9 fig. 1939.—Reduction of the cellular water content during microsporogenesis in cut inflorescences and entire plants of *Tradescantia* disturbs the coordination of 3 apparently independent though normally synchronized events: chromosome-, nuclear-, and cell-division. Polyploid microspores and pollen grains are produced. Cytokinesis by cell-plate formation is inhibited, in which case division by furrowing, not coordinated with nuclear division, often occurs. Variations of the water supply of plants may be an important factor in the production of polyploid gametes and consequently of polyploid races under natural conditions.—N. Giles.

10716. JENSEN, HENRY WILHELM. A reinvestigation of the so-called sex chromosomes in *Melandrium* (*Lychnis*) *album*. *Amer. Nat.* 73(746): 279-280. 1939.—Upon rein-

vestigation, the so-called sex chromosomes in *Melandrium* (*Lychnis*) *album* revealed a diversity of behavior in many ways resembling the abnormal conduct of the chromosomes during the reduction division in the dioecious species of *Rumex*. The sex chromosome complex of *M. album* consists of 2 unlike pairs of chromosomes, the halves of which behave in different manners, thus producing a superficial inequality. Several diagnostic hybrid characteristics are present in this species and so point to previous hybridization as the cause of the meiotic irregularities, one of which has led to the description of sex chromosomes. The fact that the genus *Melandrium* is composed of perfect as well as unisexual forms strengthens an already strong suspicion that *M. album* does not provide a valid case of sex chromosomes.—H. W. Jensen.

10717. McCLINTOCK, B. The fusion of broken ends of sister half-chromatids following chromatid breakage at meiotic anaphases. *Missouri Agric. Exp. Sta. Res. Bull.* 290. 1-48. 30 fig. 1938.—A chromatid broken at either meiotic mitosis in corn, according to the observations reported, will show a bridge configuration when the 2 split halves of this chromatid attempt to separate in the following mitosis, i.e., in the 1st nuclear division in the microspore. Indications were that the bridge is produced through a union of the 2 split halves of the chromatid at the position of previous breakage. The method of producing breaks in chromosomes included the use of an inversion in the long arm of chromosome-4 in corn. The method for relating the spores with a single chromosome involved in a bridge configuration to those which contain a chromosome broken at the meiotic mitoses, and 2 processes which result in the inclusion within a telophase nucleus of a chromosome which has no spindle fiber attachment region are described.—Courtesy Exp. Sta. Rec.

10718. NIELSEN, ETLAR L. Grass studies. III. Additional somatic chromosome complements. *Amer. Jour. Bot.* 26(6): 366-372. 1939.—The diploid chromosome numbers, given in the brackets, of the following species are reported. Festuceae: *Bromus marginatus* (42 and 70); *B. inermis* (56 and 70); *B. commutatus* (56); *B. secalinus* (14); *Glyceria grandis* (28); *Eragrostis curvula*, *E. sessilis*, *E. spectabilis* (40). Hordeae: *Elymus canadensis* var. *robustus*, *E. macounii*, and *E. sibiricus* (28). Agrostideae: *Calamagrostis epigeios* and *Agrostis exarata* (28); *Sporobolus cryptandrus* (18); *S. heterolepis* (72); *Stipa pulchra* (66); *S. columbiana* (44); *Muhlenbergia pungens* (60). Chlorideae: *Buchloë dactyloides* (56). Paniceae: *Paspalum urvillei* (40 and 60); *Panicum anceps* and *P. lindheimeri* (18); *P. texanum* (36). Andropogoneae: *Andropogon furcatus* (60); *A. hallii* (60 and 70); *A. saccharoides* (60 and 70); *A. scoparius* (40); and *A. perforatus* (80). Gross morphological comparisons of vegetative characteristics of plants of some spp. are made. Other data included are micromorphological measurements of nuclei and chromosomes, the seed or clone source of plants examined, and the collector if known.—E. L. Nielsen.

10719. SCHÜTZ, GEORG. Genetische und zytologische Untersuchungen an *Eu-Oenotheren*. Selektive Befruchtung bei der Komplexheterozygoten *Oenothera berteriana*. *Zeitschr. Bot.* 33(11): 481-525. 1939.—The 2 kinds of ♂ and ♀ gametes which compose the isogamous complex-heterozygote *Oe. berteriana* do not combine according to the law of probability. The pollen tubes with the complex B favor ovules with the complex I and conversely the pollen tubes with I the ovules with B, so that normally self-pollination leads to the production of the heterozygotic combination B.I only. The affinity of B and I gametes is greater for one another than for their like kinds; the affinity is especially low of I gametes for one another. B and I homozygotes can be obtained in the crosses of B.I with B.II or I.II of which the pollen carries respectively only B or I, but only when generous pollination leads to the fertilization of a high percentage of fertile ovules. The percentage of homozygotes is proportionately lower, the

fewer the ovules fertilized. This is in accordance with the consequences that would arise under the assumption of selective fertilization. In very meagre seed production, when homozygotes are not produced, selection cannot be satisfactorily demonstrated, because in these cases zygotic failure of B.I embryos is also observed and a reliable identification of homozygotes is not possible.—J. H. Priestley.

10720. SHAKHLEVICH, M. V. Izmeneniia akhromatinoi chasti veretena pod vlianiem razlichnykh agentov. I. Vlianie khloralhidrata na delfashchiesia kletki v koreshkakh prorstkov boba (*Vicia faba*). [Changes in the achromatic spindle under influence of different agents. I. Influence of chloral hydrate on dividing cells in the rootlet of broad bean seedlings.] [With Eng. summ. p.319.] *Russkii Arkhiv Anatomii, Gistologii i Embriologii* (Arch. Russes Anat., Histol. et Embryol.) 19(1/2): 218-225. 11 fig. 1938.—The rootlet tips of the sprouting broad bean when 2-3 cm. long were immersed in 0.75-1% soln. of chloral hydrate for 1 hr. They were killed after 1, 6, 8, 20, 27, 45, 56, 92, and 141 hrs. either in Navashin or in Champy fluid and were studied either unstained (after osmium), or stained by the Heidenheim or the Altman method. Under the influence of chloral hydrate the fibrosphere fibers are changed into irregular blocks and lumps and spread within the cell. When the metakinetic activity is restored the fibrosphere also becomes normal. Restoration of activity occurs 20 hrs. after treatment with chloral hydrate. The position and number of spindle poles depend upon the position of the fibrosphere which produces a traction apparatus to pull the chromosomes towards the poles. These facts are opposed to Belar's hypothesis that the chromosomes are pushed towards the poles. The traction fibers penetrate the nuclear membrane in prophase and come in contact with the chromosomes in the equatorial region in which the chromosomes split. This causes the chromosomes to straighten in the equatorial plate and then, after the splitting, to be pulled to the poles. The short duration of the metaphase in cell division supports this hypothesis.—P. B. Sivickis.

10721. ZHIVAGO, P. I., i K. P. TRUKHACHEVA. K probleme dinamiki "tlanushchikh volokon" v mitoze. [The dynamics of "traction fibres" in mitosis.] [With Eng. summ. p.327.] *Russkii Arkhiv Anatomii, Gistologii i Embriologii* (Arch. Russes Anat., Histol. et Embryol.) 19(1/2): 261-266. 5 fig. 1938.—Sections of root tips of *Vicia faba* and *Allium cepa*, killed in chrom-formol (San Felice and Levi'ski's methods) and stained by the Heidenheim or the Benda-Ikeda method showed that in spindle formation some fibers are always differentiated on the surface. These are central fibers and may be liquid during the earliest stages of mitosis. During metakinesis, the chromosomes touch one of these fibers through a minute liquid kinetic body, a droplet of liquid, which flows along the fiber, moistens it, and forms a kinetic sheath. The chromosome, after an accidental attachment to the spindle, slides towards the equator. The kinetic sheath remains liquid but an increase in viscosity changes it into a droplet and when the chromosome halves separate, the droplet also divides and the 2 contracting droplets pull the separated halves to the poles. In rare cases of non-disjunction the 2 droplets apparently do not break. Each chromosome thus has its own traction fiber which is not a separate structure, but a sheath on the

surface of the central fibril, which remains unbroken to the end of the telophase. The so-called connective fibers are only parts of the central fibers which become visible. Anaphasic movement is a result of contraction of the kinetic sheath into a droplet.—P. B. Sivickis.

ANIMAL

10722. BUSHNELL, RALPH J., ELIZABETH P. BUSHNELL, and MALCOLM V. PARKER. A chromosome study of five members of the family Hylidae. *Jour. Tennessee Acad. Sci.* 14(2): 209-215. 22 fig. 1939.—For *Hyla avivoca*, *H. v. versicolor*, and *H. c. cinerea*, $n=12$; for *Acris crepitans* and *A. gryllus*, $n=11$. In the 3 spp. of *Hyla* 7 of the chromosomes are large, 5 are small; in the 2 spp. of *Acris* 8 chromosomes are large, 3 are small. One chromosome in all 5 spp. of Hylidae studied is larger than the others and differs from them in its shape, its lighter staining, and its precocious splitting. This appears to be the sex chromosome. Interlocking of the ring chromosomes of the 3 spp. of *Hyla* is frequently observed in the diakinesis stages.—R. J. Bushnell.

10723. RILEY, G. M. Cytological studies on spermatogenesis in the house sparrow, *Passer domesticus*. *Cytologia* 9(2/3): 165-176. 28 fig. 1938.—The primary spermatocytes first appear during the last 2 wks. of Feb., and during the last 2 wks. of March all stages of spermatogenesis are found, and continue to occur at least through July. At the spermatogonial divisions 26 large chromosomes and 28-34 microchromosomes occur; as many as 30 of the latter have been counted following Feulgen's technique. Owing to the varying number of these small elements, $2n$ probably =54-60. The large chromosomes can be divided into 3 groups: large bent elements with sub-terminal attachments, rod-shaped elements with a knob or short crook at one end, and U- or V-shaped elements with median attachments. The 4th largest chromosome, a U-shaped element, remains unpaired in somatic divisions of the ♀, and is interpreted, therefore, as the Z-element or sex chromosome. The tetrads at 1st metaphase are thick and stain so heavily that it is impossible to identify with any certainty the chromosome types; 13 large tetrads but no more than 10 small ones were observed. During the growth period of the primary spermatocytes the spherical centriole becomes elongated to a V-shaped type, again becoming a small granule during the 2d division.—A. Hecht.

10724. SINGH, B. N., and W. BOYLE. The vitellogenesis of *Gasterosteus aculeatus* (the stickleback) investigated by the ultra-centrifuge. *Quart. Jour. Microsc. Sci.* 81(1): 81-106. 4 pl., 1 fig. 1938.—In the young oöcytes the Golgi apparatus is a solid body situated at one side of the nucleus. This body fragments and the pieces spread around the nucleus where they elongate and join up to form a network. This network moves out to the periphery of the cell where it fragments into pieces. No chromophobe part could be seen at any stage. The mitochondria are seen in the earliest stages in the archoplasmic area. Fat arises in the area which has been vacated by the juxtannuclear Golgi apparatus. There is no connection between the Golgi apparatus and the secretion of fat. The passage of material from the nucleoli through the nuclear membrane as fine granules has been described. After centrifuging, the contents of the egg become separated into 5 distinct layers.—B. N. Singh.

GENETICS

Editors: ORLAND E. WHITE, *Plant*; SEWALL WRIGHT, *Animal*

(See also in this issue Entries 10711, 10713, 10715, 10747, 11473, 11491, 11497, 11541, 11568, 11946, 11956, 11982A, 11992, 11995A, 12145, 12152, 12159, 12328, 12383, 12426, 12451)

GENERAL

10725. HERBST, CURT. Untersuchungen zur Bestimmung des Geschlechts. VIII. Die Gene als Realisatoren und die Natur der prospektiven Potenz. *Wilhelm Roux' Arch. Entwicklungsmech. Organ.* 138(3/4): 451-464. 1938.—The author presents a theoretical discussion of the character and action of the gene, and of the nature of prospective potency of the embryo, mainly on the basis of an analysis

of diplo-genotypical sex-determination. Correns' idea of the stimulation of one or the other potency of a bisexual zygote by sex-determiners ("Realisatoren") is modified by the author who declares that sex-determiners cannot be located entirely in the genom. The question is raised as to how genes lying at random in chromosomes can cause orderly organization in an embryo; correlating factors must be located in both genom and plasmon. Genes not only

stimulate development, but limit the capacities of reacting cells. The relation of egg and totipotency is similar to the relation between body and soul, between which there is a reciprocal interaction. Totipotency is regarded as a "dominant plan" ("Hauptbauplan"), which includes a number of "partial plans" ("Teilpläne"). The dominant plan is a psychic factor remaining in the domain of the unconscious. It activates the genom, which liberates the partial plans from the dominant plan, followed by the appearance of characters and remains in the organism throughout its life, allowing repair of injuries or losses in the organism.—*J. D. Thomson.*

10726. STURTEVANT, A. H., and G. W. BEADLE. *An introduction to genetics*. 391p. Col. frontispiece, 126 fig. W. B. Saunders Co.: Philadelphia, 1939. Pr. \$3.25.—Genetics is treated as a logical science dealing with measurements and ratios and with geometrical relationships of chromosomes and linkage maps, having its own system of units and thus different from other sciences based largely on mathematical techniques. The "historical" background is relegated to the 8-page last chapter. There is much illustrative material from *Drosophila* and maize, but material from other forms is also extensively utilized, and the emphasis is always on principles rather than on any given group or species. Cytogenetics is the central theme. Sex chromosomes and sex-linkage are introduced before autosomal inheritance because the relationship between distribution of genes and chromosomes is more obvious and because in this way the student will be better able to understand his laboratory work with *Drosophila*. Crossing-over is presented from the first in terms of split chromosomes to avoid over-simplified concepts that must later be corrected. Relation between crossing-over and meiosis is discussed, and much space is devoted to chromosomal irregularities including lethal effects. Monosomics, polysomics, haploids and polyploids are treated and irregularities in sex determination are briefly reviewed. The nature and action of genes is developed in chapters on multiple alleles, mutations and position effect. Relation of genes and phenotypes, overlapping phenotypes, selection and continuous variability are discussed as also the cause of heterosis. There is a chapter on extra-chromosomal inheritance and maternal effects and brief treatment of asexual reproduction and related phenomena. Outstanding aspects of species differences and of hybrids are considered. Theory of probability is presented as essential to understanding of genetic phenomena. The chapters are followed by practice problems and references to the literature.—*P. W. Whiting.*

PLANT

10727. CRANE, M. B., and W. J. C. LAWRENCE. *The genetics of garden plants*. With foreword by DANIEL HALL. 2nd ed. xiii+287p. 62 fig. Macmillan Co.: New York, 1938. Pr. \$3.25.—(The first edition was abstracted in Biol. Abstr. 11:2661). This revised edition differs from the previous one as follows: The account of pure lines and lethal genes has been rewritten and that of qualitative and quantitative characters and of linkage in *Zea mays* added; chromosome ring formation extended; chromatid segregation rewritten; multiple genes, genetics and cytology of *Iris* spp., the genetical and chemical basis of flower color and genetics of melons added; account of heterosis expanded; genetics of incompatibility in diploid and polyploid plants added; xenia described; relationship of chromosomes and fertility extended; the chromosome numbers of the plants referred to in the text have been arranged in an appendix.—*C. Zirkle.*

10728. HOFMEYER, J. D. J. *Genetical studies of Carica papaya*. L. S. African Jour. Sci. 35: 300-304. 1939.—In *C. papaya* 3 sex forms occur—staminate, ♀ and bisexual (hermaphrodite). In crosses the following ratios were obtained: ♂ (selfed) = 2♂:1♀; ♀ × ♂ = 1♀:1♂; ♀ (selfed) = 2♀:1♂; ♀ × ♀ = 1♀:1♂; ♀ × ♂ = 1♀:1♂:1♂. The following hypothesis to explain sex determination on a genetic basis is suggested: M_1 determines maleness, M_2 bisexuality and m femaleness; hence ♂ = M_1m ; ♀ = M_2m and ♀ = mm . M_1 , M_2 and m are apparently multiple alleles. The genotypes M_1M_1 , M_2M_2 and M_2M_1 are apparently not viable. The genes Y , y , for yellow, white flower color show approx.

the same linkage ($\pm 20\%$) with M_1 , M_2 and m . Purple, P , vs. non-purple, p , stem and yellow, R , vs. red, r , fruit flesh show simple mendelian inheritance and are apparently not sex-linked.—*J. D. J. Hofmeyer.*

10729. McLEAN, FORMAN T. A new fragrant gladiolus hybrid. *Contr. Boyce Thompson Inst.* 10(3): 377-380. 1 fig. 1939.—A new fragrant gladiolus hybrid is described, and its derivation is given through 4 generations, from 2 wild spp., *Gladiolus tristis* and *G. recurvus*, and 1 garden hybrid, "Gretchen Zang." A test of the ability of different people to detect the fragrance of this and of another fragrant gladiolus is descr. and the results of this test are reported. Approx. $\frac{1}{4}$ of the people can detect either of the 2 types of fragrance, each considered separately.—*Auth. abst.*

10730. SANSOME, F. W., and J. PHILP. *Recent advances in plant genetics*. 2nd ed. 412p. 55 illus. P. Blakiston's Son and Co.: Philadelphia, 1939.—Advances since 1932 are covered by re-arranging several chapters and by adding one on variegation and chimaeras with emphasis as previously on cytogenetics. To the discussion of interaction of genes there are added the works of Scott-Moncrieff on flower color and of Ephrussi and Beadle on transplantation in *Drosophila*. New work on cytoplasmic influence is briefly reviewed. Lists of linked genes are revised and recent work is reported on segmental interchange, chiasma formation and genetical crossing-over, including work on triploid *Drosophila*. Evidence from Sturtevant, L. V. Morgan and Weinstein against sister strand crossing-over and Lindgren's (1936) genetical analysis of meiosis in *Neurospora* is reviewed. *Drosophila* gene maps,—genetical, gonial, leptotene and polytene, are compared. New concepts of the nature of the gene with differences in mutation rate as affected by genic constitution and by physical agents are discussed as well as Stern's *Drosophila* and Jones' maize work on somatic crossing-over, etc. New evidence on gene size is reviewed and on "position effect" from work with bar eye, plum and scute and with gross and minute rearrangements. Much new material has been added on polyploids, haploids and aneuploids. Structural hybridity is discussed including segmental interchange, inversions, duplications and deletions, with especial reference to *Oenothera*, and finally the cytogenetics of species hybrids in *Galeopsis*, *Triticum*, *Nicotiana*, *Crepis* and *Viola*. A key to the literature with classified references has been added.—*P. W. Whiting.*

10731. SOSA-BOURDOUIL, C. Sur le pollen de l'hybride de *Digitalis lutea* L. × *Digitalis purpurea* L. *Bull. Soc. Bot. France* 85(7/8): 584-586. 1938.—The sterile pollen of the hybrid has a deficiency in protein N correlative with malformations and failure of normal germination of the pollen tube.—*P. D. Strausbaugh.*

10732. STEVENSON, T. M. Improvement of cross-fertilized crops—strain building. *Sci. Agric. [Ottawa]* 19(8): 535-541. 1939.—The term "strain building" is used by the author to define a definite procedure in the improvement of cross-fertilized crops. Examples are given of the application of the strain building method to the improvement of *Agropyron cristatum*, *Medicago media*, and *Melilotus alba*. The essential features of the strain building method, as outlined, include:—Provisional selection of plants on the basis of certain morphological characters or physiological response to certain environment; progeny test of each provisionally selected plant; diallel-crossing or top-crossing to determine combining ability; final selection of the provisionally selected plants on the basis of breeding behavior; and composite crossing of the finally selected individuals and multiplication of the crossed seed.—*T. M. Stevenson.*

10733. WERNER, G. Untersuchungen über die Selbststerilität beim Radies (*Raphanus sativus*) und Kohlrabi (*Brassica oleracea* varietas *gongyloides*). *Zeitschr. Zücht. Reihe A. Pflanzenzücht.* 22(4): 588-629. 12 fig. 1938.—Long and continuous inbreeding in the radish generally led to a decrease in yield of seed although in a few extreme cases where individuals had been rendered homozygotic, yield was larger than in the original material. This must have resulted through the cumulative effect of multiple genes. With kohlrabi the 1st generation of inbreeding resulted in a pronounced decrease of root yield, varying with the family. It is probable that here also a long inbreeding

program, resulting in homozygotic lines, would lead to specifically distinct yielding performances. Both self-sterility and self-fertility are conditioned by multiple genes in the radish as well as in kohlrabi. From 1 generation to another, in the radish, self-fertility varies much but one can plainly delimit various strains and families by differences in means. Strikingly different lines, isolated in the radish, were not possible in kohlrabi. Two sister lines of equal fertility pollinated by the same plant developed lines of diverse fertility and these 2 when again pollinated by 1 plant reversed their fertility. Evidently many non-allelomorphic genes condition fertility in this plant. Reciprocal crosses in either species are likely to give diverse results. The general development of the plant was found to be rather independent of its fertility. In many lines a striking parallel was observed between the degree of heterozygosity, self-sterility and amount of growth. In other very unified self-sterile lines of an equal degree of inbreeding the vigor of growth differed and conversely the vitality of pronounced self-fertile families was weak. In kohlrabi no close correlation was found between the degree of sterility and vigor of growth.—*L. R. Waldron.*

ANIMAL (EXCEPT MAN)

10734. BLUNN, CECIL T. The age of rats at sexual maturity as determined by their genetic constitution. *Anat. Rec.* 74(2): 199-213. 1939.—Significant differences in the mean age at sexual maturity and mean rate of growth from weaning to sexual maturity were found between ♀♀ of 2 strains of rats whose parent stocks came from widely separated localities. The reciprocal F_1 populations were early-maturing and rapid-growing like the early-maturing parent. The 4 backcross populations showed some segregation into early- and late-maturing and into slowly and rapidly growing groups. The data indicate that even though an association is found between rapid rate of growth and early maturity, they are not inseparable phenomena. For the rats studied, genetic composition is of greater importance in determining the age at which the ♀♀ become sexually mature than is the size of the litter in which they are raised to weaning time.—*Auth. (courtesy Wistar Bibl. Serv.).*

10735. MATHER, K., and TH. DOBZHANSKY. Morphological differences between the "races" of *Drosophila pseudoobscura*. *Amer. Nat.* 73(744): 5-25. 1939.—The use of statistical analyses of variance, co-variance, and the determination of discriminant functions reveals that there are significant racial differences in the number of teeth in the proximal and distal sex-combs, in the length and width of wings, and in the tibia-length of ♂♂ of races A and B. Race A ♂♂ have more teeth in sex-combs, larger wings, and longer tibiae. No racial differences in wing-size or tibia-length exist in ♀♀. The racial difference in sex-combs was equally evident in successive expts. and at different temps. Although more accurate classification would be possible with a combined score for these differences, it would be little superior to the approx. 10% misclassification if proximal sex-combs alone were used.—*H. B. Glass.*

10736. RIFENBURGH, S. A., and CATHERINE GALLO-WAY PARADISE. Radiation of *Drosophila* with low-intensity ultra-violet light for one complete generation. I. Effect on crossing-over in the second chromosome. *Proc. Indiana Acad. Sci.* 48: 216-221. 1938(1939).—A General Electric sun lamp (S2 Model K) was used as a source of radiation. Pairs of flies were placed under the lamp in beakers containing culture medium and covered with cellophane. Controls were covered with glass plates. Females emerging were tested for crossing-over and compared with crossing-over in controls. Greater crossover values were found in the treated individuals than in the controls. The difference was significant—more than 17 times its probable error in the Black-Vestigial region (which includes the spindle-fiber attachment) and over 8 times its probable error in the Vestigial-Brown region. These results agree with those observed by other investigators for x-rays, radium, and heat, who found an increase in crossing-over in treated flies, this being greater in regions near the spindle-fiber attachment than in remote regions.—*S. A. Rifenburgh.*

10737. RIFENBURGH, S. A., and J. E. SHAW. Radiation of *Drosophila* with low-intensity ultra-violet light

for one complete generation. II. Effect on crossing-over in the first chromosome. *Proc. Indiana Acad. Sci.* 48: 222-226. 1938(1939).—The calculated cross-over percentages showed no significant modification for the Yellow-White and White-Miniature regions, but there was a significant increase in crossing-over between Miniature and Bar, a region nearer than the others to the attachment of the spindle-fiber. These results are in agreement with the findings of other investigators who have worked with x-rays, radium, and heat.—*S. A. Rifenburgh.*

10738. SCHÖNMANN, WALTER. Der diploide Bastard *Triton palmatus* ♀ × *Salamandra* ♂. *Wilhelm Roux' Arch. Entwicklungsmech. Organ.* 138(3/4): 345-375. 23 fig. 1938.—Mating *Triton palmatus* ♀ × *Salamandra maculosa* or *S. atra* ♂ gives rise to true hybrids, with the diploid number of chromosomes, which develop only to the gastrula stage. Lethality is foreshadowed by abnormal mitoses before gastrulation; in anaphase and telophase daughter chromosomes have difficulty in separating. Characteristic are nuclear divisions with lagging chromosomes, resting nuclei with chromatin "tails" or "bridges" and, occasionally, pycnotic attachments. The anomalies occur in 45% of all cells undergoing mitosis and in 20% of all cells in general, reaching a maximum in the late blastula and then declining. At the end of this phase of abnormal mitosis there is an increase in pycnosis of the resting nuclei. Such pycnotic cells (30-50% of the cells of the young gastrula) break away from the living cells, fill the blastocoel and die. The remainder are normal. Hybrid tissue implanted into *T. palmatus* gastrulae shows that it is capable of normal development. Late blastulae of hybrids and normal embryos are very similar.—*C. Foote.*

10739. SCHWARZ, ERNST. Commensalism and domestication. *Amer. Nat.* 73(746): 270-278. 1939.—The commensals of man described are the house-mouse (*Mus musculus*), 4 spp. of rats (*Rattus rattus*, *R. concolor*, *R. norvegicus*, *Mastomys coucha*), and a shrew (*Suncus caeruleus*). The changes developed in commensals are described in detail in the house-mouse. They affect color, pattern, and shape; those characteristic of the commensal are found to be produced by recessive allelomorphs of genes occurring in the original wild type. The main difference between the commensal and the domesticated animal is that in the commensal natural selection is active, and the number of recessive mutants therefore limited, whereas in the domesticated type a greater number of recessives survive under protected conditions and balanced breeding controlled by artificial selection.—*E. Schwarz.*

10740. WALTON, A., and J. HAMMOND. The maternal effects on growth and conformation in Shire horse-Shetland pony crosses. *Proc. Roy. Soc. [London] Ser. B* 125(840): 311-335. 2 pl., 10 fig. 1938.—Three foals produced by crossing a Shire stallion with Shetland mares were not significantly different in weight from pure Shetland foals. Two foals produced in the reciprocal cross were smaller than Shires, but the differences were not significant. The weights of all foals were about 8% of the weights of their dams. A comparison of the growth of 3 ♀♀ of the different types of breeding showed that the cross-bred filly from the Shire dam grew especially rapidly until weaning at about 4 mos., after which there was a distinct drop in growth rate. The cross-bred did not grow nearly as rapidly as the purebred Shire, and the weight attained at 3 yr. was intermediate between average Shetland and Shire weights but greater than the weight of the cross-bred from the Shetland dam. The cross-bred from the Shetland dam grew only a little more rapidly than a pure Shetland filly, but after weaning the cross-bred filly from the Shetland dam grew much more rapidly than pure Shetlands. The difference between the 2 types of cross-breeds was still very marked at 3 yr. of age. The differences in ratios between the measurements of body parts in cross-breeds were not great. The maternal effects are suggested as due to (1) the maternal regulation of fetal nutrition, (2) maternal hormonal control, or (3) cytoplasmic inheritance. The interplay of genetic and nutritional factors in growth and development is considered.—*Courtesy Exp. Sta. Rec.*

MAN

10741. DAHR, PETER, und WALTER BUSSMANN. Familienuntersuchungen über die Vererbung der "Unter-

gruppen" A_1 und A_2 . *Zeitschr. Rassenphysiol.* 10(2/3): 49-64. 1938.—A study of 106 families with 450 children showed 2 exceptions to the theory of Thomsen et al., the second of which could not be due to illegitimacy or exchange of children. It is possible that A_1 and A_2 correspond respectively to strong and weak development of a factor A. All the inheritance studies up to date on A_1 and A_2 are summarized.—*W. C. Boyd.*

10742. DAWIDENKOW, SERGIO. La forma recesiva de la Amiotrofia Charcot-Marie. *Rev. Neurol. Buenos Aires* 3(3): 177-184. 2 fig. 1938.—Describes a case of Charcot-Marie-Tooth muscular atrophy and presents a chart of the ancestry which contains various anomalies such as hypertrichosis of face, hypotonia, syndactylism and anisocoria. Concludes that this case presents recessive inheritance, the parents being heterozygotic first cousins.—*R. M. Patterson.*

10743. LEMSER, H. Zur Erb- und Rassenpathologie des Diabetes mellitus. *Arch. Rass.- u. Ges.-Biol.* 32(6): 481-515. 1938.—Studies of diabetes in 49 pairs of twins show that the disease will ordinarily not occur unless there is an inherited predisposition; but that not every one who has inherited the tendency will become diabetic. Different degrees of severity depend on inherited modifying factors; but the clinical course, including age of onset, depends largely on environmental conditions.—*P. Popenoe.*

10744. SOUTHWICK, WALTER E. Autosomal linkage between the factors for the production of identical and of fraternal twinning. *Human Biol.* 11(2): 179-196. 1939.—An analysis of 1,131 pairs of twins in 140 kindreds filed in

the Eugenics Record Office showed that the frequency distribution curves obtained by determining the percentage of like sexed twins in groups of 2 or 3 twins, and in units of from 1 to 15 such groups, were trimodal. This distribution is interpreted to indicate that the large median modal class is composed of units produced by chromosomes that bear genes for both types of twinning, while the other modes are composed of units which contain chromosomes with the genes respectively for monozygotic or for dizygotic twinning with, in each case and reciprocally, the normal allele of the other gene. These 2 latter types are believed to have developed from the 1st type by means of crossing over, and this evidence indicates a genetic linkage between the genes for the 2 types of twinning, while a study of the sexes of the ancestors of the twins indicates that these genes are not sex linked. Monozygotic and dizygotic twinning in man, therefore, is believed to be produced by 2 genetically linked genes on an autosomal chromosome.—*W. E. Southwick.*

10745. STODDARD, S. EDMUND. The inheritance of "hollow chest." *Jour. Heredity* 30(4): 139-141. 2 fig. 1939.—A study of the anomaly, also known as "cobblers chest," was carried through 4 generations. Of the 102 individuals involved, 49 actually possessed "hollow chests." Medical examination showed the propositus to be in normal health, exhibiting no bossing of the skull bones or other signs of rickets. This study recorded additional evidence for the inheritance of funnel breast as a dominant autosomal factor.—*S. E. Stoddard.*

BIOMETRY

JOHN W. GOWEN, *Editor*

10746. CRIST, J. W. Intraclass correlation for horticultural research. *Proc. Amer. Soc. Hort. Sci.* 36: 347-350. 1938(1939).—The simplest method for calculating intraclass correlation, as distinguished from ordinary interclass correlation, is demonstrated with data taken on the number of berries per bunch on grape vines of the same general class. This type of correlation appears to have many possibilities for use in horticultural research, where the question of the organic unity of structure, function, and response in plant forms so frequently arises.—*J. W. Crist.*

10747. HENDRICKS, WALTER A., JOSEPH P. QUINN, and ALBERT B. GODFREY. Interpretation of Mendelian class frequencies. *Jour. Agric. Res.* 58(10): 755-760. 1939.—The principles involved in the interpretation of Mendelian class frequencies are discussed. A new χ -square table which facilitates the interpretation of such data is presented and some published data in the field of genetics are discussed from the point of view of the statistical behavior exhibited by experimental data.—*W. A. Hendricks.*

10748. KRAUSE, R. H., and H. S. CONRAD. New and extended tables of the unit normal curves. I. Areas ($\frac{1}{2}$) corresponding to abscissae from .00 to 10.0 PE. II. Abscissae (x/PE) corresponding to areas ($\frac{1}{2}$) from .000 to .49999 99999 9. *Jour. Psychol.* 5: 397-424. 1938.—This paper contains, besides the tables mentioned in the title, a table of coefficients of x/PE in the expansion of the integral of

the unit normal curve, a table of errors in Burgess' table of H , a list of errors in other previously published tables, and an account of the construction of each of the tables.—*J. McV. Hunt (courtesy of Psych. Abst.).*

10749. PEDELABORDE, J. L. Metodo Grafico para el Analisis Rapido de las Distribuciones Mendelianas. [A graphic method for the rapid analysis of the Mendelian ratios.] *Rev. Argentina Agron.* 6(1): 35-40. 1 fig. 1939.—The method consists essentially of the representation of the theoretical ratios and their probable errors on the same graph, so that the relation of the deviation to the probable error for every expt. can be seen at once by plotting the observed values without adding them. The method fulfills every condition of the standard calculations, gets to the final results at once, shows which of the Mendelian ratios fits the exptl. data and avoids the trouble of finding the theoretical values. When there are 2 ratios with non-significant deviations the graph shows how many individuals are necessary to eliminate doubt.—*J. W. Gilmore.*

10750. VOLTERRA, VITO. Calculus of variation and the logistic curve. *Human Biol.* 11(2): 173-178. 1939.—A statement and demonstration of a theorem of Calculus of Variations, already used by the author in treating questions of the struggle for existence. By means of this theorem he deduces Pearl's equation from a principle of the minimum.—*V. Volterra.*

ECOLOGY

Editors

W. C. ALLEE, *General Animal Ecology*
G. D. FULLER, *General Plant Ecology*
CHANCEY JUDAY, *Hydrobiology (Oceanography, Limnology)*

FREDERICK A. DAVIDSON, *Ecology of Wildlife Management—Aquatic*
W. L. MCATEE, *Ecology of Wildlife Management—Terrestrial*
ROBERT G. STONE, *Bioclimatics, Biometeorology*

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Geographical pathology, 11698; Sedge-mosquito associations, Maryland, 12214; Bacteria affecting endomixis in *Paramecium*, 12280; Diplopods associated with bird and mammal nests, 12318; Zoogeography of myriopods of Mauritius, 12319; Adaptation of *Eriocheir* in Europe, 12325; Zoogeography of Curculionidae of Wallacea, 12345A; Desert adaptations in Scarab beetle, 12352; Lepidoptera of French Alps, 12392; Emergence of Lepidoptera, 12396; Social behavior in caterpillars, 12398; Trichoptera, 12408. [PLANT ECOLOGY]: Moss communities of Sardinia, 11838; Ecol. anatomy of *Solenostemma*, 11899; Cotton mycorrhizas, 11945; Germination of grass seed, 11957; Soil erosion control, 11959; Soil pigmentation in U. S., 11964; Sub-surface erosion in S. Africa, 11966; Erosion control, 11988; Exotic plants cultivated in Netherlands, 12014; Photosynthesis in Alpine plants, 12084; Gas exchange of lichens, 12088; pH of leaf sap of conifers, 12118)

GENERAL

10751. CARPENTER, J. RICHARD. The biome. *Amer. Midland Nat.* 21(1): 75-91. 1939.—The development of the concept of the biotic community is traced through the earlier American and European literature with short quotations from the more important papers. The development of the concept of the biome, a climax biotic community of the size of a formation, *sensu* Clements, is likewise traced, its units defined, and an example given of its application to the grassland regions of N. America from a recent study by the author. Reference is also made to the development of systems of biotic community classification other than that of the biome and the limitations of their application pointed out.—J. R. Carpenter.

BIOCLIMATICS, BIOMETEOROLOGY

(See also in this issue Entries 10767, 10799, 10803, 10808, 11492, 11957, 11964, 12090, 12396)

10752. JOHNSON, BURT, and CECIL H. WADLEIGH. Certain ecological factors and the cotton plant. *Arkansas Agric. Exp. Sta. Bull.* 376. 1-51. 47 fig. 1939.—The relations of certain ecological factors to the cotton plant as expressed by the yield of cotton were studied by means of multiple curvilinear correlation for the area comprising the 6 eastern counties of Arkansas and for the period, 1919-1935. The weather factors considered were monthly rainfall, number of rainy days in a month, monthly mean maximum temp., cumulated monthly mean minimum temp., and a combination of monthly rainfall and monthly mean maximum temp. These factors were studied for the period, March to Oct., inclusive, or in some cases during the months of greatest growth of the plant. In general, rainfall in April, May, and July showed high correlation with yield, but there was less co-variability of yield to rainfall in June. Rainfall at or near the minimum reported for these months was associated with the best yields, provided that there was a proper distribution of these small precipitations. Increasingly high monthly mean maximum temps. in May, June, and Aug. are associated with increased yields. Increases in the monthly mean maximum temps. in July above 93°F and in Sept. above 86°F are associated with decreasing yields.—C. H. Wadleigh.

10753. KRÖL, OSZVÁLD. Adatok a növények "válságos időszak"-ának kérdéséhez. [The "critical period" of plants.] [With Ger., Fr., and Eng. summ.] *Erdészeti Lapok* 78(4): 382-393. 2 fig. 1939.—Holdeffiss' method of correlating weather with height growth of trees is applied incorrectly, for he fails to take account of the fact that height growth depends not only on weather but also on the growth energy of the plant. The "critical period" is not exclusively a physiological phenomenon, but also depends on the character of the soil, especially its capacity for making water available for the plant.—W. N. Sparhawk.

10754. MADE, A. Das Einfadenwiderstandsthermometer als Messgerät zur Bestimmung der Oberflächentemperatur von Blättern. *Bioklimatische Beiblätter* 6(1): 11-13. 1 fig. 1939.—Thermocouples are unsuitable for the measurement of leaf temps. because of their high heat capacity and the influence of the surrounding air and the radiation on the thermocouple. A platinum wire-resistance thermometer is

described consisting of a wire 4 cm. long, and 20 μ in diam. The maximum radiation error is only 0.2°C. Continuous records of leaf temps. with this thermometer in a Wheatstone bridge circuit are possible and no influence upon the heat transactions of the leaf is to be feared. A sample record for leaves of *Billbergia nutans* and *Plecanthus fruticosus* is reproduced.—H. Landsberg.

10755. MANIG, M. Nachweis von Kaltluft durch erfrorene Dahlien. *Bioklimatische Beiblätter* 6(1): 22-23. 1 fig. 1939.—Near Schreiberhau (Silesia) early frosts develop in the wake of outbreaks of polar maritime air which lower the air temp. nearly to the freezing point. Heat loss by radiation and gravitational accumulation of the cold air kill the dahlias in topographic troughs, whose boundaries can be mapped by noting frozen and unharmed dahlias. Potatoes and ferns are similarly affected.—H. Landsberg.

10757. POTZGER, J. E. Microclimate, evaporation stress, and epiphytic mosses. *Bryologist* 42(3): 53-61. 1939.—An atmometer study of differences in evaporation on north and south sides of trunks of trees, 6 feet above the ground, and bases of trees, located in shallow ravines and flat uplands. Comparison is between similar habitat sites in an open woodlot on the Butler Univ. campus, Indianapolis, Indiana, and a typical beech-maple woods on the Fort Harrison reservation, 15 miles east of Indianapolis. Trunks of trees had as much as 166% greater loss than comparable bases of trees. Comparisons between upland and ravine stations showed differences ranging from 28 to 162% greater losses on the upland stations. As a whole, the stations in the Butler campus woods had greater losses than comparable stations at Fort Harrison. In some cases this amounted to 37.8%. Average weekly losses at the ravine stations in the Butler campus woods were similar to those in the upland woods at Fort Harrison. Apparently, air currents are the chief factor contributing to the differences in water loss in the various habitat sites. Comparing water losses on trees supporting no moss vegetation in ravines on the Butler campus with those on uplands at Fort Harrison, also supporting no moss vegetation, indicates that moisture controls the establishment of moss communities on trees in this central Indiana region.—J. E. Potzger.

10758. RICHARDS, L. A., and M. B. RUSSELL. A method for recording evaporation from a porous atmometer cup. *Iowa State Coll. Jour. Sci.* 13(1): 17-19. 1938.—The rate and amt. of evaporation from a porous atmometer cup can be recorded by an automatic drop counter. Water enroute to the porous cup is caused to form in drops in a kerosene-filled chamber, the time of fall of each drop being recorded on a chronograph drum. A graph is given showing the evaporation rate for a 3-week period. The maximum rate occurred between 3 and 6 p. m., the minimum rate between 3 and 6 a. m.—Authors.

10759. SARGENT, F., and A. J. NEDZEL. The cold front and the toxicity of morphine sulphate. *Bioklimatische Beiblätter* 6(1): 26-29. 3 fig. 1939.—Groups of mice were kept on a normal, an acid and an alkaline diet. A certain quantity of morphine sulphate was injected. The percentages of deaths and the time lapse between injection and death were observed. Mortality was lower in the animals on alkaline diet. After the passing of a cold front the

mortality is greater and the time lag between injection and death is shorter. The less time elapses between the passage of the front of cold air and the injection the faster the animals die and the higher is the percentage mortality.—*H. Landsberg.*

10760. SAUBERER, F. Über die Lichtverhältnisse der Binnenseen. *Bioklimatische Beiblätter* 6(1): 33-41. 4 fig. 1939.—A summarizing report on light measurements in inland lakes with 41 references, mainly dated between 1933 and 1938. The principal topics discussed are: methods, with particular reference to photo-electric cells and light filters; the absolute measurements of radiation in various depths and spectral transmission in various lakes; reflection from the surface; measurements with Petterson's transmission meter and Secchi's plate.—*H. Landsberg.*

10761. SCHNELLE, F. Phänologische Studie über die Wintergerenate 1938 bei einer Eisenbahnfahrt. *Bioklimatische Beiblätter* 6(1): 18-22. 1 fig. 1939.—The development of the winter rye in the North German Plain west of Berlin was graded from the window of a train by noting the percentage of fields in various stages of harvest, at the end of July 1938. The dry fields, usually corresponding to higher slopes, were more advanced than moist fields. Near forests and waters the development of the rye was retarded. In agreement with the general climatic conditions the territory east of the Elbe river showed more advanced stages of the harvest than that west of the river.—*H. Landsberg.*

10762. SYDOW, E., G. RIEMERSCHMID, und M. TIEDEMANN. Messungen der Ultraviolettstrahlung in Lapland und Spitzbergen (unter Vergleich mit der biologischen Erythemwirksamkeit). *Bioklimatische Beiblätter* 6(1): 29-33. 4 fig. 1939.—Measurements were made with Frankenburg's ultraviolet dosimeter. The variability of the u.v. radiation within the Arctic Circle does not differ greatly from that observed on the German North Sea coast. For clear sky the relation of the intensity to solar elevation was as follows: at 10°, 25°, 35° and 45°, 1, 3, 7 and 12 dosimeter units, respectively. On cloudy days the values were about $\frac{1}{3}$ as great. Measurements on the peak of Stuur Järta, altitude 1550 m., showed similar values of which, in 15° solar elevation, 70% could be attributed to diffuse radiation from the sky, and at 40° solar elevation, 55%. For solar elevations above 25° the relation between radiation intensity (I) in dosimeter units and the time (t) in minutes elapsing before the first appearance of erythema on skin of average sensitivity is $It=250$. Erythema developed at low solar elevations of 16° in 40 min. and of 8° in 3 hrs. This was due to long wave lengths which are not properly recorded by the dosimeter.—*H. Landsberg.*

10763. WILSON, J. D., and R. R. PATON. Comparative evaporation rates in a normal forest, open park, and cleared areas. *Ohio Agric. Exp. Sta. Bimo. Bull.* 24(198): 64-69. 1939.—Evaporation was measured over a period of 4 yrs. for sites of different exposure in 4 state parks or nurseries by means of black and white atmometers. The light which penetrated the foliage of a normal forest and a park-like area (as measured at the 4-foot level by the difference between black and white atmometers) was 10.5 and 41%, respectively, of that in a cleared area, over a 16-wk. period from June 1 to Sept. 20. These B-W values made up 29.6, 18.8, and 9.1% of the total loss from the black atmometer in the cleared, open park, and normal forest areas, respectively. White atmometers (which measure effect of all factors but sunshine) lost 77 and 46% as much water in the open park and normal forest areas as in a clearing, respectively.—*J. D. Wilson.*

10764. WINKLER, C. A. Dew-point hygrometer for use at low temperatures. *Canadian Jour. Res. Sect. D* 17(2): 35-38. 1 fig. 1939.—An apparatus is described in which provision for slow cooling of a metal mirror by circulating over it liquid from a vessel in a thermoregulated bath, and the use of multiple thermocouple elements contained in the mirror, enable the dew-point temp. to be gradually approached and accurately detd. Precise measurements of relative humidity at low temps., where the moisture content of the air is small, are therefore possible. A precision of $\pm 0.5\%$ relative humidity was readily attained at temps. down to -15°C .—*Auth. abst.*

ANIMAL

10765. ADAMSON, A. M. Review of the fauna of the Marquesas Islands and discussion of its origin. *Bernice P. Bishop Mus. Bull.* 159. 1-90. Map. 1939.—The land and freshwater fauna is reviewed and analyzed. The geography, geology, flora, etc., of the islands are considered in relation to the origin and development of the fauna. Biogeographical theories regarding central Pacific islands are summarized and discussed—no comprehensive modern scheme, to replace the obsolete scheme of Wallace and his followers, has yet been proposed. The affinities of the Marquesan fauna are largely Indo-Malayan, and its history began not later than the early Tertiary. The way in which central Pacific islands acquired their faunas and floras remains obscure, but an attempt is made to outline the possible history of the Marquesan fauna, 1) on the assumption of extensive former land-connections, and 2), according to the alternative view that all islands within the Pacific depression are strictly oceanic and dependent on overseas dispersal alone.—*A. M. Adamson.*

10766. DETHIER, V. G. Further notes on cannibalism among larvae. *Psyche* 46(1): 29-35. 1939.—Larvae of *Estigmene acrea* and *Isia isabella* (Lepidopt.) attacked and ate mutilated insects more readily than uninjured insects. Living victims were rendered quiescent by buffeting before being eaten. Crowding increased the percentage of cannibalism, apparently by increasing the frequency of chance meetings. Phytophagous larvae were successfully raised to maturity on a meat diet. Proteases and diastases were found in the guts of these animals and a histological examination of the feces showed that most of the constituents of a meat diet were utilized. Additional cases of cannibalism in nature and in the laboratory are reported.—*V. G. Dethier.*

10767. GLICK, P. A. The distribution of insects, spiders, and mites in the air. *U. S. Dept. Agric. Tech. Bull.* 673. 1-150. Map, 5 pl. 1939.—Specially devised traps to collect insects were attached to airplanes at Tallulah, Louisiana. During a 5-year period, from Aug. 1926 to Oct. 1931, 1,314 flights were made in Louisiana and 44 in Mexico. 30,033 specimens of insects, spiders, and mites were taken at altitudes ranging from 20 to 15,000 feet. 18 orders of insects and the orders of spiders and mites were collected. There were represented in the Louisiana collections 216 families, 824 genera, 4 new genera, 700 spp., and 24 new spp. The order Diptera was the most abundant order in the air, and nearly 3 times as many specimens were taken of this as of any other order. Coleoptera followed next after Diptera in the numbers taken. Homoptera and Hymenoptera were taken at 14,000 ft., the highest altitude at which insects were found. The highest altitude at which any specimen was taken was 15,000 ft., at which a spider was caught. Numbers of adults, nymphs, and larvae of wingless forms of insects and mites were collected in the upper air at altitudes as high as 14,000 feet. These wingless forms are all at the complete mercy of the upper air currents. There is much evidence to support the conclusion that many of the insects taken in the upper air were alive at the time they were collected. Many specimens were alive when removed from the screens. The insects are listed in detail with the altitudes at which they were taken in several tables. The size, weight, and buoyancy of an insect contributes directly to the height to which it may be carried by air currents, and this may be expressed in terms of the aerostatic or lighter-than-air coefficient. The aerostatic coefficient varies directly with the area of the insect which is exposed perpendicular to the pull of gravitation and inversely with the weight per unit of exposed area. The numbers of insects taken followed closely the differences in the surface vapor pressure, dew point, temp., and wind direction. Spiders were found to be affected by dew point and barometric pressure. The maximum numbers of insects were found at sunset. There was a tendency for insects to be more active in the upper air on nights when there was considerable moonlight. Convection currents and turbulence of the air play an important rôle in determining the insect population in the upper air. Flights over the area flooded at Tallulah, La., in 1927 showed that fewer insects were in the air at lower altitudes, but at altitudes of 1,000 ft. and above the numbers taken were approx. the same as over the non-flooded territory, indicat-

ing that insects flew or drifted in. Pink bollworm moths were collected in Mexico at as high as 3,000 ft., indicating that the moths are carried in the upper air currents for considerable distances. Modern aircraft offer a new source of danger in the dispersal and distribution of diseases and dangerous insect pests.—*P. A. Glöck*.

10768. GRAHAM, SAMUEL A. Forest insect populations. *Ecol. Monogr.* 9(3): 301-310. 1939.—Economically important forest insects probably represent less than 1% of all forest insects. They may be divided into 3 groups: those which maintain balanced populations at high density, those that appear in sporadic outbreaks, and those that occur in periodic outbreaks. The number of spp. in the 1st group is not great; only a few forest insects when in a state of equilibrium are sufficiently abundant to cause damage and then injure the trees without killing them (the white pine weevil and the Nantucket pine-moth). Sporadic outbreaks occur as a result of temporarily changed conditions and the insect populations return to normal when usual conditions are restored. Examples are secondary barkbeetle outbreaks along newly constructed roads, near places where fresh wood is stored, and in places where recent thinnings have been made. Periodic outbreaks are most serious of the 3 groups. They are characterized by concentrated populations that appear suddenly, often over tremendous areas. They are usually associated with weather favorable to the insects, with single sp. forests, and with over-mature forests. Repeated eruptions usually occur at relatively regular intervals. Factors involved in stimulating and retarding periodic outbreaks are discussed and attention is drawn to the need for a long-time sustained research program.—*S. A. Graham*.

10769. HOLZAPFEL, M. Markierungsverhalten bei der Hyäne. *Zeitschr. Morph. u. Ökol. Tiere* 35(1): 10-13. 2 fig. 1939.—Hyenas in captivity were observed to mark out a territory by smearing the secretion of the anal glands (presumably odoriferous) upon certain objects in their den or cage. The habit of dogs of urinating upon prominent objects is probably of the same nature.—*L. H. Hyman*.

10770. KINTER, EDWARD. Notes on Indiana fresh-water sponges. *Proc. Indiana Acad. Sci.* 48: 244-245. 1938 (1939).—Several northern Indiana lakes and streams have been explored to learn something of their sponge populations, mainly from ecological and systematic standpoints. In some lakes no sponges could be found; in others several spp. were quite numerous. Where they were found in a given lake they were usually numerous in its outlet; but in other streams, they were rare or absent. Even in lake outlet they were decidedly more numerous near the lake. Sediment seems to be the chief factor in determining whether they can exist in a given stream.—*E. Kinter*.

10771. MALUF, N. S. RUSTUM. The longevity of insects during complete inanition. *Amer. Nat.* 73(746): 280-285. 1939.—Compiled data are presented to show that, in most cases, the duration of insects without food or water does not exceed a few days; but there are notable exceptions. Water is generally the limiting factor. Fat is the main metabolite during starvation. There is no rigorous correlation between the standard rate of metabolism of an animal and the length of time it can endure without food and water.—*N. S. R. Maluf*.

10772. PARK, ORLANDO, W. C. ALLEE, and V. E. SHELFORD. A laboratory introduction to animal ecology and taxonomy. A laboratory guide with keys prepared with particular reference to fresh-water and terrestrial habitats of the deciduous forest region in North America. x + 272p. 17 pl. University of Chicago Press: Chicago, 1939.—This contains an introduction on the interrelationship of animals with their environments followed by a series of exercises on the constituents of the terrestrial and fresh-water faunas, and a discussion of faunal percentages and quadrats and of cave animals. Synoptic keys to 21 phyla are carried out to the orders or other large subdivisions with references to the pertinent literature. There is a glossary of technical terms, an extensive bibliography, and taxonomic and subject indices.—*C. A. Kofoed*.

10773. SARELY, HARVEY E. Ecological relations of certain animals in dead pine and oak tree trunks. *Ecol. Monogr.* 9(3): 321-385. 8 fig. 1939.—A succession of animals, chiefly insects, was found in decaying pine and oak tree

trunks. This succession was conditioned partly by the animals themselves, but principally by the action of wood-rotting fungi. The subcortical temp. in pine logs in the summer was as much as 45°C when air temp. was 33°C. In winter, sudden changes in external temp. were buffered by the logs, but the temp. within the logs usually reached the minimum air temp. Air under the bark of rotting logs contained as much as 5.53% CO₂. Larvae of *Monochamus titillator*, *Romulea atomarium*, and *Acanthocinus nodosus* survived higher temps. in an atmosphere of 10-15% relative humidity than in one 95-100% saturated. The thermal death points of *Chrysobothris femorata* and *Dendroides bicolor* were not affected by rel. humidity. Larvae of *Calidius antennatus* and *Chrysobothris* spp. fed on phloem of pine and removed starch from the wood they ate; they consumed approx. 77 and 79 g. of dry body wt. respectively. Larvae of *Derobrachus brunneus* were able to digest cellulose. The gut contents of 22 spp. of beetles of doubtful food habits were examined. The animals collected from dead pine and oak tree trunks were listed together with data on the stages found, their probable food habits, and the length of time since the tree trunk had died.—*H. E. Sarely*.

10774. WARREN, A. EMERSON. An ecological study of the sea mussel (*Mytilus edulis* Linn.) *Jour. Biol. Bd. Canada* 2(1): 89-94. 1936.—The distribution of the sea mussel beds of the Passamaquoddy bay area is almost exclusively intertidal. The expts. herein reported show that mussels grow most rapidly when constantly submerged. Their general absence below the low tide level, therefore, is attributed to the particular abundance in this region of the predatory fauna.—*A. E. Warren*.

10775. WINDECKER, W. *Euchelia* (Hypocrita) *Jacobaeae* L. und das Schutztrachtenproblem. *Zeitschr. Morph. u. Ökol. Tiere* 35(1): 84-138. 9 fig. 1939.—From the literature and the author's own expts. it is shown that the cinnabar moth is distasteful to mammals, birds, reptiles and amphibians and that the bad taste comes from the hemolymph. The fresh pupa is not distasteful but with age develops a bad-tasting hemolymph. The conspicuous black-and-yellow ringed larvae are also unpleasant to vertebrates because of chemical substances present in the skin. Since vertebrates learn to avoid the moth and larva through experience, the conspicuous coloration of these stages of the insect is a case of protection through warning colors. Expts. showed that birds and mammals remembered the unpalatability of this insect for long periods of time. The *Euchelia* moth further is protected by its great resemblance to another unpalatable lepidopteran *Zygaena filipendulae*, a case of Müllerian mimicry. The *Euchelia* larva shows cryptic protective coloration in regard to its host plant (*Senecio*) when the latter is in bloom. In the absence of these blossoms, the larva is conspicuous and hence an example of warning coloration. It is also protected by the resemblance of its black-and-yellow pattern to that of wasps. The protective value of the conspicuous coloration was shown in expts. with hens which had learned to reject *Euchelia* larvae; they also rejected mealworms colored so as to resemble *Euchelia* larvae. The results show that cryptic and aposematic coloration and Müllerian mimicry can exist in the same animals. The findings are opposed to the work of Heikertinger.—*L. H. Hyman*.

PLANT

10776. BEATH, O. A., C. S. GILBERT, and H. F. EPPSON. The use of indicator plants in locating seleniferous areas in western United States. II. Correlation studies by states. *Amer. Jour. Bot.* 26(5): 296-315. 1939.—Studies were made of the Se content of 563 specimens of native plants from 12 of the western states, correlating the presence of Se in plants with the geological formation on which the plants grew. Special attention was given to spp. of *Stanleya*, *Oenopsis*, *Xylorrhiza* and *Astragalus* in these states as primary indicator plants capable of pointing out the presence of Se in formations contemporaneous with known seleniferous formations of Wyoming and also indicating the occurrence of Se in formations not previously investigated. The *Stanleya* spp. and *Astragalus* spp., because of their wide distribution, proved especially valuable as indicators. The following have been added to the previously known list of Se-containing formations: (1) Pennsylvanian limestones of

S.E. and central Nevada; (2) Payette Lake sediments in S.W. Idaho; (3) Carbonaceous and limy shales in Provo Canyon, Utah; (4) Tertiary sediments in Tonto Basin, Arizona; (5) White Tank Monzonite near Twenty-nine Palms, California; (6) The Moenkopi formation in southern Utah and northern Arizona; (7) Areas in S.E. Idaho, N.W. Utah, S.E. Oregon, and Nevada where the geology was not known to the authors.—O. A. Beath.

10777. CARR, LLOYD G. Some notes on the ecology of plants of Magnolia Swamp, Augusta county, Virginia. *Claytonia* 5(4): 37-46. 1939.—Upwelling lime spring water, bathing roots of plants growing in mediacid humus, apparently is responsible for the presence of both acid- and lime-loving plants growing together. Some coastal-plain plants, notably, *Magnolia virginiana*, are found in this swamp in the Valley Province, west of the Blue Ridge mountains. An annotated list of the plants is given.—R. S. Freer.

10778. CHAMPION, H. G. The relative stability of Indian vegetational types. *Jour. Indian Bot. Soc.* 18(1): 1-12. 1939.—Change rather than stability is characteristic of Indian vegetation. The evidence for this view is surveyed and the active agencies are discussed with examples. The most influential are considered to be grazing and burning together with their cessation where formerly prevalent, and modern directive human control. Changes in progress in the different main vegetative types are described, and the need is stressed for ecological studies on account of their scientific interest and their increasingly important economic value.—H. G. Champion.

10779. CURTIS, JOHN T. The relation of specificity of orchid mycorrhizal fungi to the problem of symbiosis. *Amer. Jour. Bot.* 26(6): 390-399. 9 fig. 1939.—Ten spp. of *Rhizoctonia* were isolated from 23 spp. of orchids from various habitats in the U. S. and Central America. Two new species are described—*R. borealis*, and *R. monilioides*. No evidence of specificity was found, as one orchid species could harbor several fungus spp., and any one fungus species could attack a number of different orchids. The fungi were correlated with ecological habitat rather than with orchid species. Symbiotic germination tests, using fungi isolated from a given orchid in combination with the seeds of that orchid, indicated in most cases that the fungi were unable to induce germination of the seed. The symbiotic relationship is concluded to be one of parasite and host, with the orchid deriving no benefit from the fungus in its roots.—J. T. Curtis.

10780. EVENARI, MICHAEL (WALTER SCHWARZ). Root conditions of certain plants of the wilderness of Judaea. *Jour. Linn. Soc. [London] Bot.* 51(340): 333-338. 1938.—The life form of the roots of 9 perennial and 3 annual plants was investigated. The roots of the annuals penetrate only a few cm (the maximum in *Erucaria boveana* with 7 cm.) and have few secondary roots. The succulent perennials have a superficial root system (*Suaeda asphaltica* and *Zygophyllum dumosum*). The main roots of some other perennials (*Haplophyllum tuberculatum*, *Heliotropium rotundifolium*, *Reseda muricata*, *Erodium glaucophyllum*) penetrate more deeply into the soil and curve through a right angle to continue growing horizontally. Only *Retama retam* and *Atriplex halimus* are deeply rooted (to 1.1 m. in *Retama*). The area occupied by the roots of all desert perennials is very large; e.g., the root system of *Retama* spreads over an area of 38-39 sq. m. Root competition is absent.—M. Evenari.

10781. GERSBACHER, EVA OXFORD, and EDNA M. NORTON. A typical plant succession at Reelfoot Lake. *Jour. Tennessee Acad. Sci.* 14(2): 230-238. 1 fig. 1939.—Six fairly distinct plant communities have established themselves in and around this earthquake lake. Complete list of spp., pH of soil, and depth of water are given in each community. A line transect is shown of the 6 zones, beginning with the submerged and extending out into the floodplain. A belt transect illustrates a section of the pioneer tree and flood-plain area.—E. O. Gersbacher.

10782. GLEASON, H. A. The individualistic concept of the plant association. *Amer. Midland Nat.* 21(1): 92-110. 1939.—Since plant migration is free and continuous, each area in a region is open to colonization by every species within migrating distance. Since environment continually fluctuates from time to time on the same spot, and from

place to place at the same time and also shows general trends in variation from time to time and place to place, there is accordingly a similar and universal variation and fluctuation in vegetation both in time and in space. Certain features of the environment are reasonably constant over a measurable space, as soil, or through a considerable period, and their vegetation consequently maintains a reasonable homogeneity over an appreciable area and a reasonable permanence for a considerable time. Such areas of vegetation are unit communities. Since every community varies in structure and since no 2 communities are precisely alike or have a genetic connection, a logical classification of communities is impossible.—H. A. Gleason.

10783. JUDD, B. I., and M. L. JACKSON. Natural succession of vegetation on abandoned farm lands in the Rosebud Soil Area of western Nebraska. *Jour. Amer. Soc. Agron.* 31(6): 541-557. 1939.—During the first 5 yrs., annual spp. predominate. Annual grasses flourish in the 3d yr. and decline rapidly in the 4th to 6th yrs. *Agropyron smithii* leads the perennial grass entrance, beginning in the 4th yr. and dominating the whole cover in the 6th. At 10 to 15 yrs. nearly all of the cover is composed of the perennial grasses of which 14% is the climax short grasses. A germination study was undertaken in which a high viability of seed was found for all but 3 of the 24 native grasses tested. Similarly, all but 1 of the 15 native legumes showed high viability, when the seeds were scarified. Natural succession of vegetation is important in the Great Plains from an agronomic standpoint in returning abandoned cultivated lands to forage production. After 5 yrs., the yield of grass hay often exceeds $\frac{1}{2}$ ton per acre in moderately wet yrs.—B. I. Judd.

10784. KILLIAN, C. La biologie des sols argileux des environs d'Alger et la question des plantas indicatrices. *Ann. Agron. [Paris]* 9(2): 269-300. 1939.—The location and general character of the soils studied—clays and chalks—were described in the previously published introduction. The indicator plants chosen were *Hedysarum flexuosum*, *H. capitatum* and *Scorpiurus sulcata*. These were studied in pure stands, mixed stands and their "stand limits" fixed. Both *Hedysarum* spp. indicate poor soil with non-permeable subsoil. However, as soon as leaching is evident and the soil podsolizes *H. flexuosum* disappears. *H. capitatum* prefers richer soils, with CaCO_3 . *Scorpiurus* seedlings develop better under a sand layer. It is concluded that relations between soils and any indicator plant species are highly complex.—R. R. McKibbin.

10785. MATTHEWS, J. R. The ecological approach to land utilisation. *Scottish Forest. Jour.* 53(1): 23-34. 1939.—The distribution of damp and dry oakwoods (*Quercus robur* and *Q. sessiliflora*) is related in Britain to soil type. The ground vegetation is characteristic of each. If birch follows the degeneration of oak this can be recognized by the relic plants. Birch in Highland valleys in Scotland bears no evident relation to pre-existing oak. Its distr. is determined by climate. In sub-alpine regions Scots pine and birch occur and may compete. Degeneration of birch wood gives hill grass, that of pine gives moorland. Within the general types of hill land referred to as rough pasture and moor are many communities. A careful study of these in relation to soil and reaction to grazing is urged, with a view to their correct treatment in agriculture and forestry.—J. A. Macdonald.

10786. MILLER, FRANK J. The influence of mycorrhizae on the growth of shortleaf pine seedlings. *Jour. Forestry* 36(5): 526, 527. 1938.—In a Forest Service nursery it was observed that after a satisfactory germination stand the shortleaf pine seedlings growing in soil not in pines the previous year remained dormant during the late spring and summer, while those growing in soil in pines the previous season maintained a consistent rate of growth throughout the entire season. The author suspected these differences to be related to the absence and presence, respectively, of mycorrhizae. A careful study of 3 test plats appeared to confirm this theory. It is believed that the expts. indicate a desirable planting succession to be a soiling crop the 1st yr., pine transplants the 2d yr., 1-0 shortleaf pine the 3d yr., etc. While the data here presented are not considered conclusive, it is believed that their presentation will aid in solving some of the problems found in pine nurseries established in old farm land.—F. V. Rand (courtesy of Exp. Sta. Rec.).

10787. OLSEN, CARSTEN. Undersøgelser over Bund-

floraen i danske Egeskove og Egekrat. [Investigations on the bottom flora of Danish oak-woods and oak-scrub.] *Bot. Tidsskr.* 44: 367-432. 1938.—The bottom flora in 113 localities was investigated by means of the statistical method of Raunkiaer. The oak-wood, since the Stone Age the dominant type of wood in Denmark, has in the course of historic times nearly everywhere been ousted by beech-woods. Most of the oak-woods existing in Denmark at the present day have therefore been artificially produced; but in a few places in the country remnants of the original oak-woods still occur, and these were included in the investigation. The Danish oak-woods can be divided into 3 main types, viz: (1) Oak-woods on sandy morainic clay. Some of this type occurs on Funen; in a comparatively natural state, not having been under the charge of a forester. As the soil is fertile, the oak-trees (*Q. robur*) are well-developed, and a dense underwood, 7 m high and composed chiefly of *Corylus avellana*, is found. The amount of light which reaches the forest-ground is 1.5-6% of the daylight in the open and the bottom flora is poor in species. The following spp. dominate: *Anemone nemorosa*, *Oxalis acetosella*, *Asperula odorata*, *Alium ursinum*, *Mercurialis perennis*, *Melica uniflora*, *Geum urbanum*, *Stellaria holostea*, *Pulmonaria officinalis*, and *Primula elatior*; (2) Oak-woods on hard morainic clay. These woods are found only on Lolland, in low-lying, moist, hard clay soil. Oak does not thrive very well in this soil, but the beech thrives more poorly, and the beech-wood has therefore never succeeded in ousting the oak-wood. The underwood consists mainly of *Corylus avellana*, but *Carpinus betulus*, *Acer campestre*, *Crataegus oxyacantha*, *Prunus padus*, *Lonicera periclymenum*, and *Hedera helix* may also be present. In these woods also the soil is rather deeply shaded. *Deschampsia caespitosa*, *Primula elatior*, and *Carex silvatica* are very dominant in the bottom flora everywhere; and (3) Oak-woods and oak-scrub on sandy soil. This type is found only in Jutland. In some few places oak (*Q. robur* and *Q. sessiliflora*) forms forests, in most places only scrub, which is chiefly due to the misuse of the forest by man. An open undergrowth, formed chiefly by *Juniperus communis* and *Rhamnus frangula*, may occur in the forest. The amount of light reaching the forest-ground is considerable (10-20%), and the bottom flora is consequently rich in species. On mouldy soil the following species exhibit great frequencies: *Pteridium aquilinum*, *Luzula pilosa*, *Festuca rubra*, *F. ovina*, *Poa pratensis*, *Dactylis glomerata*, *Holcus mollis*, *Anthoxanthum odoratum*, *Melica nutans*, *Deschampsia flexuosa*, *Convallaria majalis*, *Majanthemum bifolium*, *Rumex acetosa*, *Viola canina*, *Oxalis acetosella*, *Fragaria vesca*, *Veronica chamaedrys*, *Melampyrum vulgatum*, and *Phyteuma spicatum*. In many places the soil is covered with a raw humus layer and here the bottom flora is poor in species and chiefly made up of *Vaccinium myrtillus*, *Deschampsia flexuosa*, and *Melampyrum vulgatum*.—H. E. Petersen.

10788. ROMOSE, VAGN. Undersøgelser over Skallingens Mossflora. [Investigations on the moss flora of the Skalling.] *Bot. Tidsskr.* 44(4): 439-458. 1938.—The paper is a result of an investigation made during a stay on the Skalling peninsula (western Jutland), which is little affected by cultivation. It comprises dune, heath, meadow, and marshy ground. There is a list of the mosses found on the peninsula and on the island of Langli situated near the Skalling. A careful investigation of the distribution of the species in the communities was made on the basis of the theory that the bottom layer ("Bodenschicht" according to G. E. du Rietz: *Handbuch der biol. Arbeitsmethoden*, Abt. IX, H. 2) of the communities is composed of a mosaic of quite small moss communities consisting of one or some few spp. This mosaic must be assumed to be due to a highly varying microclimate and to differences in level. The methodics employed in the investigation was not entirely objective. The statistical method of Raunkiaer must be regarded as little suited for an investigation of the distribution of the mosses in the plant communities.—V. Romose.

10789. ROUSCHAL, ERNST. Zur Ökologie der Macchien. I. Der sommerliche Wasserhaushalt der Macchienpflanzen. *Jahrb. wiss. Bot.* 87(2/3): 436-523. 1938.—The Mediterranean maqui is characterized by lack of rain and high evaporation conditions. This results in desiccation of the soil, at the

surface by evaporation, below by the plants. Under these conditions water loss from the leaves and water movement in the soil and into the root system proceed slowly. Some plants, as *Cistus*, have their roots in the upper 20 cm. of soil where the suction pressure exceeds 80-100 atmospheres, and where roots cannot possibly obtain sufficient water. The suggestion that the leaves may then take up water from dew at night is rejected as of no ecological significance. The diurnal transpiration curve has a sharp maximum between 8 and 9 a.m., a depression at mid-day and a smaller maximum in the afternoon. The morning maximum is due to the rapid increase of evaporation and the opening of stomata in sunshine; the depression is due to the increasing saturation deficit and the closing of the stomata. Mainly in cases of transpiration in the shade a one-peaked curve may be found with this peak early or delayed to mid-day or the afternoon. During the dry season the water loss of all plants diminishes but the water exchange is still considerable in comparison with the fresh wt.—in 13 of 21 plants investigated more than 100% per hr. This high water exchange can only be explained by very high suction pressures. The plants show very high resistance to the rapidly increasing saturation deficits under these conditions. The following types of maqui plants are distinguished: (1) plants with small transpiration, small saturation deficits, e.g., *Ruscus*, *Iris*, *Smilax*. (Schimper's xerophytic type); (2) plants with large transpiration, limited generally by increasing dryness, and with water balance strongly disturbed but balanced by high resistance to drying, e.g., *Phillyrea*, *Cistus*, *Myrtus*, etc. (Maximow's xerophytic type); and (3) plants with high transpiration and small saturation deficit, e.g., *Pistacia lentiscus* and *P. terebinthus*, *Rubus*, the water balance being maintained as the result of a rapid water exchange, only possible with a very well developed root system. The osmotic value of cell contents in evergreens in a dry period rose to very great heights—increases of 100-200% occurring. Comparative measurements of velocity of water movement in the wood system of the maqui plants by the thermoelectric method (of Huber) distinguishes 2 types—(a) velocity in stem > in branches (oak type of Huber), e.g., *Quercus ilex*; (b) velocity in stem < in branch (birch type of Huber), e.g., *Arbutus*.—The applicability of the term "summer rest" to the conditions of the woody perennials of the maqui is criticized.—J. H. Priestley.

10790. WEIMARCK, H. Bidrag till Skånes Flora. [Contributions to the flora of Scania (Sweden).] *Bot. Notiser* 1939(2): 357-392. 19 fig. 1939.—Besides giving extensive lists of species and their distribution the author has devoted a chapter to the importance of mineral soils for the composition of the flora. Lists of species are included giving the classification in Eurytrophs, Oligotrophs, Mesotrophs, and Eutrophs. Another section describes the vegetation in swamps, ponds and lakes. Vegetation boundaries are also established with maps showing the spread and frequency of *Erica*, *Narthecium* and *Galium pumilum*.—T. R. Swanback.

10791. WHITFIELD, CHARLES J., and CLAUDE L. FLY. Vegetational changes as a result of furrowing on pasture and range lands. *Jour. Amer. Soc. Agron.* 31(5): 413-417. 4 fig. 1939.—Contour furrows on range lands in the Southern Great Plains, through reducing runoff and increasing soil moisture storage, encouraged the return of original vegetative types. Density and yield of palatable grass spp. increased, weeds and less desirable grasses decreased.—Authors.

OCEANOGRAPHY

(See also in this issue Entries 12323A, 12337)

10792. COOPER, L. H. N. Phosphorus, nitrogen, iron and manganese in marine zooplankton. *Jour. Marine Biol. Assoc. United Kingdom* 23(2): 387-390. 1939.—Analyses of P, N, Fe and Mn are recorded for *Balanus balanoides* nauplii (a cirripede crustacean), post-larval *Callinectes* *lyra* (a teleostean fish), mature *Sagitta elegans* (a chaetognath), *Pleurobrachia pileus* (a ctenophore) and for crab zoeas and megalopas. A sample of *S. setosa* contained much more iron than did *S. elegans*. *Pleurobrachia* is relatively poor in P, N and Fe and its ash-free protoplasm must be rich in either fats or carbohydrates. Neither *Pleurobrachia* nor *Balanus* nauplii effect any appreciable conc. of Mn from sea water.—L. H. N. Cooper.

10793. EDMONDSON, CHARLES H., and WILLIAM M. INGRAM. Fouling organisms in Hawaii. *Bernice P. Bishop Mus. Occas. Papers* 14(14): 251-300. 9 pl. 1939.—Presents results of a biological survey in which the principal fouling organisms of Kaneohe Bay, Oahu, were determined, and their seasons of greatest productivity, rate of growth, and general ecology were investigated. The organisms include barnacles, bryozoans, serpulid worms, oysters, and ascidians. Minimum growth is in winter. The behavior of various organisms to altered conditions is discussed: also the resistance to temp. changes, fresh water, desiccation, bright sunlight, 9 metals, color of surfaces, poisonous compounds added to paints, and 8 commercial antifouling paints. Bibliography.—E. H. Bryan, Jr.

10794. FRASER, JAMES H. The distribution of *Chaetognatha* in Scottish waters in 1937. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(1): 25-34. 1939.—Examination of 1937 Scottish plankton confirms that the distribution of *Sagitta* spp. is a reliable indication of hydrographical conditions. *S. maxima*, *S. hexaptera*, *S. serrato-dentata* and *Eukrohnia hamata* are found in the oceanic water entering the area. On mixing with coastal water these are replaced by *S. elegans* and it is this mixed water that is most conducive to a rich plankton. *S. setosa* is found in the coastal water of the southern North Sea. The extent of distribution of *S. elegans* in the North Sea is in direct relationship to the strength of the influx and in 1937 this was greater than in 1936.—J. H. Fraser.

10795. GOODHART, C. B. Notes on the bionomics of the tube-building amphipod *Leptocheirus pilosus* Zaddach. *Jour. Marine Biol. Assoc. United Kingdom* 23(2): 311-325. 3 fig. 1939.—*L. pilosus* lives in a tube which is rather different from that of other spp. The tube is a small blister-like capsule usually attached to the thallus of *Chondrus crispus*. The homogeneous leathery wall of the capsule is built of minute particles of detritus cemented together by a secretion produced by large glands on the 1st and 2d pereopods. Final cementing is performed by unicellular glands on the coxal plates. Setae on the 2d gnathopods strain the food particles from the respiratory water-stream flowing down the tube. Being a form of deposit-feeding but differing from the usual type in that the mouth parts are not directly involved, it is proposed to use the term "sieve-feeding" for it. Brief observations on the breeding habits are made. The occurrence of copulation is doubtful; parthenogenesis may take place.—C. B. Goodhart.

10796. MOORE, HILARY B., and J. A. KITCHING. The biology of *Chthamalus stellatus* (Poli). *Jour. Marine Biol. Assoc. United Kingdom* 23(2): 521-541. 1939.—*C. stellatus* and *Balanus balanoides* are littoral barnacles, the former having a southern and Atlantic distribution, and the latter a northern and North Sea one. In its need for the presence of Atlantic water, *Chthamalus* is compared with *Sagitta elegans* and intertidal *Echinus esculentus*. Wherever the 2 barnacle spp. occur in the same locality, their relative success and ability to survive any given adverse environmental factor is conditioned by the general degree of favorability of the other factors. Extension to low levels on the shore seems to be an indication of favorable conditions. The effects of temp., salinity, immersion, water-movement, sediment, presence of Atlantic water, nature of substratum, competition with *B. balanoides*, and enemies, are discussed. Some account is given of the growth-rate, and the modification of this at different levels, degrees of wave-exposure and ages.—H. B. Moore.

10797. REES, COLIN B. The plankton in the upper reaches of the Bristol Channel. *Jour. Marine Biol. Assoc. United Kingdom* 23(2): 397-425. Map. 1939.—Because of the difference in speeds of the tidal streams, the observations made at a single station for a year refer to a length of channel. Gradients of salinity and phosphate, a succession of diatom spp., and a change in the vertical distribution of *Eurytemora affinis*, occurred along this length. The movement of water, either from up-channel or down-channel, into the investigated length, changed the average salinity from 22‰ in winter to 28‰ in summer. This movement brought a succession of copepods, and possibly diatoms, into the investigated length. The poverty of the phytoplankton, and the absence of a normal spring maximum were due to

the inhibiting effect of the instability and extreme opacity of the sea-water. The bacterial analysis indicated sewage pollution.—C. B. Rees.

10798. WATKIN, E. EMRYS. The pelagic phase in the life history of the amphipod genus *Bathyporeia*. *Jour. Marine Biol. Assoc. United Kingdom* 23(2): 467-481. 1939.—A survey of the *Bathyporeia* population of the sand of Kames Bay, Millport, during March 1937, showed that 4 spp., *pilosa*, *pelagica*, *elegans* and *guilliamsoniana* are present and are zoned in relation to tide level. The population contained 15% adult ♂♂ and 25% adult ♀♀. A series of tow-nettings taken across the tidal waters of the bay at night throughout 1936 showed that the 4 spp. perform nocturnal vertical migrations and retain their zonation when swimming in the tidal waters. An analysis of the tow-net population gave 42% adult ♂♂ and 15% adult ♀♀. A review of the literature indicates that a nocturnal vertical migration is a marked feature of a few benthic amphipod families and possible factors which govern this migration are discussed.—E. E. Watkin.

LIMNOLOGY

(See also in this issue Entries 10760, 12319A, 12323)

10799. ATKINS, W. R. G. Illumination in algal habitats. *Bot. Notiser* 1939(1): 145-157. 2 fig. 1939.—Formulae are given for the evaluation of submarine illumination at different depths and records are given for light absorption in different parts of the spectrum. The intensity of incident daylight is reduced to 1% at depths ranging from 0.5 to 10 m. or more, depending upon the transparency of the water and the season of the year. Correlated with the intensity of the sub-surface illumination, 3 algal zones were found on estuarine buoys in Plymouth Sound. Plants in Zone I required a high percentage of daylight (more than 80%); those of Zone II, a smaller percentage (25-68%) and those of Zone III, a still smaller amount (0.4-10%). Algae may extend down to a depth of 45 m. and red algae have been reported at a depth of 130 m. in the Mediterranean.—T. R. Swanback.

10800. LEONARD, J. W. Mortality of aquatic Diptera due to freezing. *Ent. News* 50(4): 107-108. 1939.—On April 4, 1938, a small pond in southern Michigan froze over following 2 weeks of unseasonably high temps. which rose as high as 80°F. A great number of midge pupae (*Chironomus plumosus*) were embedded in the ice while preparing to transform. The local population of this midge, important in the diet of fishes, may have been severely reduced.—J. W. Leonard.

10801. MITIS, HEINZ v. Die Ybbs als Typus eines ostalpinen Kalkalpenflusses. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 37(4/5): 425-444. Map, 4 photographs. 1938.—This preliminary announcement of a physical, chemical, and biological survey of the Ybbs, a tributary of the Danube rising near Lunz, describes the physiography and states the aims and methods of the investigation. The system is regarded as typical of streams in regions of youthful landscape, and of the northern Dolomite Alps in particular. Detailed reports on the fauna and flora by various specialists and by the author will follow.—E. S. Deevey.

10802. MIYADI, DENZABURO. Limnological survey of Taiwan (Formosa). *Arch. Hydrobiol.* 35(1): 1-27. 2 pl., 10 fig. 1939.—Zitugetu-tan is a large lake, formerly with brown water and but 5 m. deep, now owing to the diversion of a river and damming, 36 m. deep, when visited, and with clear water; the bottom deposits are yellowish brown with a black reduction layer at the surface, and are very rich in organic matter. Sango-tan is an entirely artificial reservoir, 18 m. deep, much deposition owing to landslides is occurring and the bottom is poor in organic matter. Kotô-hi is an old reservoir 12 m. deep, only littoral studies were made. Ryûvan-tan is a shallow relic basin of marine origin, astatic and never more than 1.5 m. deep. Toapi-ike is a small lake 3 m. deep, the bottom deposits are reddish brown and poor in organic matter. Rigyo-ti is a natural lake 7.5-9 m. deep, the bottom deposits are soft and yellowish brown, rich in organic matter. Summer surface temps. go little over 30°C, circulation occurs in winter (Jan.) at 18°-20°. In stratified localities even with deposits poor in organic matter (Sango-tan) the O₂ is depleted in the hypolimnion

by the middle of April. The water is generally alkaline and at least moderately rich in Ca, here affording a great contrast with Nippon. It is known, however, that acid waters poor in Ca occur in pools in the mts. of Taiwan. The waters are in general eutrophic, some figures for N and P are given. The transparency is low, in Zitugetu-tan and Rigyo-ti, owing to water blooms, in the other lakes owing to silt. In general the benthic fauna is very poor. In the littoral this is largely due to natural and artificial changes in water-level. In the deep water of Zitugetu-tan there are practically no organisms, in Rigyo-ti, none below 6 m., Sango-tan and Toapi-ike have a small benthic fauna, in the former case composed of *Tubifex*, in the latter of Tany-pinae and a few *Corethra*. The extensive organic content of the muds of the first 2 may be responsible. Ryūran-tan, high in Ca from water flowing off raised coral reefs, supports a large population of molluscs, mostly *Melanoides scalaris* and *M. obliquegranosa*.—Several recent zoogeographical papers on the freshwater fauna of Taiwan, published in Japanese, are reviewed. Oriental forms predominate, the fauna being nearest that of southern China. Palaearctic affinities are much greater in the fishes than in other groups such as batrachians, northern cold stenotherm forms occur in the mountains. There is little affinity with the Philippine fauna.—G. E. Hutchinson.

10803. PICHLER, WOLFGANG. Ergebnisse einer limnologischen Sammelfahrt in den Ostalpen (Steiermark). *Arch. Hydrobiol.* 35(1): 107-160. 5 pl., 7 fig. 1939.—Twenty-nine small bodies of water at varying altitudes up to 2000 m. are described in detail. A classification of such waters is proposed on the basis of:—I. Presence or absence of outlet. II. Humus content low, alkaline or neutral, water colorless; humus moderate, weakly alkaline to weakly acid, water from almost colorless to pale yellow-brown; humus high, moorland neutral to strongly acid brown waters. III. Nutrient materials according to the Kolkwitz and Marsson system; in polysaprobe localities a distinction between the effects of cattle dung and dead leaves is important. IV. Temp. in relation to morphology. The last criterion permits a division into: 1. puddles (Tachen), maximum depth 20 cm., maximum diurnal temp. variation up to 30° C. 2. pools (Tümpel) maximum depth 70 cm., maximum diurnal temp. variation at surface 15° C, at bottom 5° C. 3. ponds (Weiher) and small lakes, maximal depth over 70 cm., maximal diurnal temp. variation 10° C at surface and 2° C at bottom. 4. lakes maximum diurnal variation of temp. in pelagial region of surface 3° C, at bottom no diurnal variation. In the first 2 categories there is little protection against insolation; it is suggested that the red color of high alpine copepods is correlated with high u.-v. light. *Daphnia pulex* and *Chydorus sphaericus* are the commonest cladocera in the shallow, strongly illuminated waters; both are more deeply colored than at lower altitudes, the former is rose colored, the latter dark brown. The amplitude of variation in the water level is clearly important in classification. The plankton of lakes is best developed where least water runs through the basin. When the phytoplankton is adequate *D. l. longispina* is the most conspicuous. Of this animal *f. littoralis* is the commoner form (as in Sachwiesensee) associated with thermal instability but not with the coldest water; in the cold and very thermally unstable Krumpensee *f. rosea* transitional to *f. friedeli* occurs. Only 2 Diaptomidae occur in the lakes, *Diaptomus bacillifer* limited to alkaline waters (5 localities pH 8) and *D. denticornis* found also in ponds and euryonic (25 localities, pH 4.5-8.8). The ponds studied are mostly artificial and at low altitudes. Omitting those lacking Diaptomidae, they are divided into *D. zachvatkini* ponds, shallow and eutrophic and *D. denticornis* ponds generally humic or high in iron, with a great range of pH values. The pools are divided into alpine meadow pools (Almtümpel), moorland pools, forest pools, springfed pools and swamps. The last 2 types were little studied. Transitional pools occur. The alpine meadow pools are distinguished as: (a) *Diaptomus tatricus* pools, pH 5.5-7, much influenced by cattle dung, with red-brown water, containing *D. tatricus* (pH range 4.5-7) with *Daphnia pulex obtusa*, *Sigara carinata* (Hemip.) and larvae of *Neuronia ruficrus* (Trichop.) and in the less acid examples *Brachionus sericus*; and (b) *Heterocypris incongruens* pools, pH 6-9, organic matter low, or rapidly decomposed, water never red-brown,

without *Diaptomus*, with *H. incongruens* dominant, *D. pulex obtusa* and *B. sericus* abundant. *Hyalotheca dissiliens* grows in (a) but not in (b). The moorland and forest pools are considered together as constituting a group of acid (pH 4.5-6.5) *Ceriodaphnia quadrangula* pools, the same pH range is given for this species, on the basis of 9 records. *Streblocerus sericeus* usually occurs, *D. pulex obtusa* and *D. tatricus* are casual.—G. E. Hutchinson.

10804. ROLL, HARTWIG. Zur Terminologie des Periphytons. *Arch. Hydrobiol.* 35(1): 59-69. 2 fig. 1939.—Previous usage is reviewed. The Periphyton may be divided into Epiphyton (Aufwuchs) consisting of the totality of unassociated sessile organisms and the Lasion (Bewuchs), the totality of associated sessile organisms on a substratum. A complete series of transitions occurs but the extreme types are very distinct. The distinction is made clear by drawings showing on the one hand single diatoms, protozoa, etc., attached far from each other on pieces of *Cladophora* (Epiphyton), and on the other a tangled mat of filamentous algae and diatoms with nematods, etc., on a solid substratum (Lasion).—G. E. Hutchinson.

WILDLIFE MANAGEMENT—AQUATIC

(See also the section "Pisces"; and Entries 10693, 10956, 11629, 11755, 11758, 11774)

10805. COLE, H. A., and E. W. KNIGHT JONES. Some observations and experiments on the setting behaviour of larvae of *Ostrea edulis*. *Cons. Pern. Internat. Explor. Mer Jour. Conseil* 14(1): 86-105. 1939.—The swimming habit of the fully developed larva resembles that of the earlier stages except that the foot is often protruded. When this comes into contact with a surface the larva may embark upon the crawling phase that always precedes setting and during which the quality of the surface is tested. It may resume swimming to seek another surface before finally selecting a spot to exude the byssus cement and settle. Metamorphosis can be delayed in the absence of a suitable surface. Expts. under semi-natural conditions in large breeding tanks show that the following factors markedly influence setting: Angle of surface—An horizontal slate caught 12,407 spat on its underside, an inclined slate (45°) 6,123, and a vertical slate 119; upper surfaces were rather more favored than vertical. Light-shaded glass-plates caught, over a long period, 3 times as many spat as similar clear ones. At night this difference did not appear, by day it was still more marked. The general intensity of setting decreased at night. The intensity of setting at the surface was always high. The numbers setting near the bottom (depth 2 m.) were small, especially during the day when the larvae appeared to swim more strongly. Observations on a natural bed showed the paucity of suitable places for attachment on bottoms where old shell-culch was abundant. Floating collectors should prove most valuable in any practical scheme of oyster culture.—Authors.

10806. ELSON, PAUL F. Order of appearance of scales in speckled trout. *Jour. Fish. Res. Bd. Canada* 4(4): 302-308. 2 fig. 1939.—In *Salvelinus fontinalis* two scale papillae develop on the lateral line over each myotome. They appear as far back as the adipose fin and independently on the dorsal line anterior to the adipose fin. The scale pattern develops by extensions obliquely forward from the primary papillae. Development is more rapid in the posterior region. Chief variations are bifurcation of rows and extension of rows posteriorly.—Auth. abst.

10807. HOOVER, EARL E. Age and growth of brook trout in northern breeder streams. *Jour. Wildlife Management* 3(2): 81-91. 1939.—Where the temp. of the water of a so-called breeder stream remains low at all times the trout population may be resident and of slow growth. The expectation that there will be constant emigration from such streams to tributaries for breeding often is not fulfilled. Downstream migration, if it exists, involves the larger fishes and may be a reaction against limited space in headwaters.—W. L. McAtee.

10808. MEDCOF, J. C. Larval life of the oyster (*Ostrea virginica*) in Bideford River. *Jour. Fish. Res. Bd. Canada* 4(4): 287-301. 1 fig. 1939.—Oysters spawn when ripe, with rising temps. that may or may not reach 20°C and at times not determined by lunar cycles. The growth of the larva to the ultimate size; height 365μ, at 19, 20 and 21°C,

requires 30, 26 and 24 days respectively. The growth curves developed, not sigmoidal in shape, have been used to predict spatfall maxima.—*Auth. abst.*

10809. NEEDHAM, P. R., and H. JOHN RAYNER. The experimental stream, a method for study of trout planting problems. *Copeia* 1939(1): 31-38. 1939.—The method by which a small stream was layed off into exptl. plots for the study of trout planting is described. Marked fish were planted in varying numbers in each plot. After completion of the fish growth expts. each plot was pumped dry and the fish removed. During the exptl. period records were kept of the aquatic food available to the fish. A discussion of the research problems arising in this type of study is given and reference is made to other types of inland aquatic problems that may be studied through the application of the exptl. stream method.—*F. A. Davidson.*

10810. POWERS, EDWIN B., A. RANDOLPH SHIELDS, and MARY E. HICKMAN. The mortality of fishes in Norris lake. *Jour. Tennessee Acad. Sci.* 14(2): 239-260. Map. 1939.—During the winter months of 1937-8, the rapid pulling down of Norris lake at the rate of approximately 0.9 feet per day and large inflows of low temp. waters from 2 tributary rivers, the Clinch and the Powell, so stirred the water of high CO₂ content in the lake with other waters that it brought about a condition of high CO₂ tension throughout the lake. The small shad, a surface and near surface fish, alternating between the surface water of lower CO₂ tension and the water below the surface of higher CO₂ tension became deranged and died. This sudden death of the fish is explained as follows: fishes have been found to tolerate a wide range of CO₂ tension in waters by increasing the alkaline reserve of their blood in waters of high CO₂ tension and decreasing their alkaline reserve in waters of low CO₂ tension. However if fishes alternate quickly between waters above a certain minimum difference in CO₂ tension they become deranged and die regardless of the O₂ contents of the waters.—*F. A. Davidson.*

10811. PRITCHARD, A. L. Homing tendency and age at maturity of pink salmon (*Oncorhynchus gorbuscha*) in British Columbia. *Jour. Fish. Res. Bd. Canada* 4(4): 233-251. 4 fig. 1939.—Pink salmon fry were marked by the removal of certain fins to ensure later identification as adults. This procedure does not affect the growth or the feeding reactions of the fish. 3 expts. were conducted on natural runs at McClinton creek, Masset inlet, B.C. On the basis of the most significant one of these it is concluded that the majority of the fish return to spawn in the stream in which they were hatched. Isolated individuals, in numbers not economically significant, may wander to a distance of 400 miles. In the case of fry resulting from transplantation expts. from Tlell river, east coast of Graham island, to McClinton creek, there appears no consistent behavior in regard to "homing." For fry, hatchery-raised and pond-reared, from Vedder river, Swelter creek eggs, no return to the parent stream was reported. All pink salmon mature in the autumn of their 2d year. Certain incidental checks in growth have been discovered on scales which should not be interpreted as representing a winter.—*Auth. abst.*

10812. RAE, BENNETT B. Marking experiments on lemon soles at Faroe 1923-1936, with a note on Icelandic markings 1925. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(1): 35-47. 1939.—Out of 964 fish marked and liberated by the Scottish research vessel at Faroe, 217 were recaptured, all by commercial vessels. Of the total recaptured, 182 were returned within a year of liberation, 30 more within 2 yrs. and only 5 survived for longer than 2 yrs. The rate of recapture, more rapid than in Scottish waters, increased after 1930 with the increased activities in the commercial fishery. The heaviest catches of lemon soles are obtained during the summer months. A certain amount of migration takes place round the islands in an anti-clockwise or contranantant direction.—*B. B. Rae.*

10813. RUSSELL, F. S. On the seasonal abundance of young fish. VI. The year 1938. *Jour. Marine Biol. Assoc. United Kingdom* 23(2): 381-386. 1939.—This report continues the series of observations on the seasonal abundance of young fish in the plankton off Plymouth. It describes the conditions for the year 1938, in which there was a continued poverty of young fish. This scarcity is linked

with the low phosphate content of the water and the absence of rich water is indicated by a study of the *Sagitta* population.—*F. S. Russell.*

10814. SMITH, M. W. The fish population of Lake Jesse, Nova Scotia. *Proc. Nova Scotian Inst. Sci.* 19(4): 389-427. 1 fig. 1937/38(1939).—This study is based on a sample of fish secured after treatment of the lake with CuSO₄ (Aug. 3, 1934) to eradicate predators and competitors of speckled trout. Practically all fish came into the shores. The fish production was estimated by counting and weighing fish from measured sections of the shore-line. The estimated population was 36,035 fish, or 19.9 pounds per acre. The following spp. were present: *Salvelinus fontinalis*, *Notemigonus crysoleucas*, *Semotilus atromaculatus*, *Catostomus commersonnii*, *Ameiurus nebulosus*, *Anguilla rostrata*, *Fundulus diaphanus*, *Perca flavescens*, *Morone americana*, *Pungitius pungitius*. *Fundulus*, *Perca* and *Morone* were the most numerous. Predator species, *Perca* and *Morone*, constituted 57% of the population. Each species is discussed separately, and data on length, weight, sex and relative condition of the fish are presented. The growth rate of *Perca* and *Morone* was slower than that determined for other lakes. Females appeared to live longer, although both sexes grew at almost the same rate. The population was dominated by fish in the 2d, 3d and 4th years of age. There were few fish of the year, indicating the dominance of predators. Fish over 4 years of age were scarce. The dominance of certain year classes suggests a cycle in the fish production, which would determine a scarcity of fry in certain years and a scarcity of older fish in others. Some species may have migrated into and out of the lake. 15,000 speckled trout fingerlings were introduced into the lake in each of the years 1929, 1931 and 1932; 29 trout were secured in 1934. A fish population, predators and competitors, as found in Lake Jesse, appears inimical to successful planting with trout fingerlings.—*Auth. abst.*

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 10683, 10686, 11750)

10815. BENNETT, LOGAN J. The blue-winged teal. Its ecology and management. xiv+144p. Col. frontispiece, 37 fig. Collegiate Press, Inc.: Ames, 1938.—The author studied the blue-winged teal (*Querquedula discors*) for 5 years (1932-'37) chiefly during migration and nesting in northwest Iowa, made a survey of a considerable portion of its western breeding range in Aug., 1933, and spent 4 weeks on its wintering grounds in Mexico, 1936-'37. The book deals with the life history and ecological requirements of the species essentially from the standpoint of wildlife management but incorporates much information of broader scientific interest. Local productivity appears to vary not only with nesting cover (generally grassland within a few hundred yards of marshes), rearing cover for young birds (bulrushes, etc. over the water), and relative stability of water levels at periods critical in reproduction, but also with the length of shoreline in proportion to water area. Apart from the effects of drought and drainage upon habitats, deficiencies in nesting and rearing cover significantly lower the attractiveness for blue-winged teal of many lakes and marshes still remaining in its breeding range; while both nesting and rearing cover may be lacking, often the balance between the two is unfavorable, nesting cover being adequate about open bodies of water or, conversely, rush-grown marshes surrounded to their edges by cultivated fields or closely grazed pasture. Integration of land use and conservation are stressed, and distinction is made between ill-considered drainage and exploitation of waterfowl environment and that which may be economically or otherwise justifiable.—*P. L. Errington.*

10816. CHAPMAN, FLOYD B. Use of chemical sprays to increase yields of fruits utilized by wildlife. *Jour. Wildlife Management* 3(2): 141-143. 1939.—A survey of natural wildlife foods and factors controlling their production in southern Ohio indicated that certain insect pests and fungus diseases, some of which attack domestic fruits also, are responsible for decreased palatability, premature abscission, decay before ripening, or complete destruction of wild fruits. The wildlife manager might profitably

utilize certain chemical sprays, especially in managed refuges, in order to improve the yield and quality of certain fruits and to prolong their availability into critical periods. The use of a lead arsenate spray on 2 species of wild grapes (*Vitis aestivalis* and *V. labrusca*) gave excellent results in controlling the grape berry moth. Vines treated with 2 applications of a spray prepared by dissolving 4 level tablespoonfuls of Pb arsenate in one gallon of water with a soap spreader retained their fruits until midwinter when they were most useful to ruffed grouse, songbirds, and certain mammals.—*F. B. Chapman.*

10817. DICKERSON, L. M. The problem of wildlife destruction by automobile traffic. *Jour. Wildlife Management* 3(2): 104-116. 1939.—It is suggested that an experimental approach be made to the problem of reducing the frequency of fatalities to wildlife resulting from automobile traffic. The data used include observations on roadside cover conditions associated with the presence of victims observed over a period of more than 3 years and more than 12,000 miles of travel. A statistical comparison is made between data collected by the writer and similar information previously published. The frequency of dead animals is shown to be much greater on highways through plains country where only grass or low herbaceous cover is found than in other parts of the country where woody cover is more common.—*L. M. Dickerson.*

10818. EMLEN, JOHN T. Jr. Seasonal movements of a low-density valley quail population. *Jour. Wildlife Management* 3(2): 118-130. 1939.—The movements and social relations of valley quail, *Lophortyx californica vallicola*, on the Univ. of California farm at Davis were followed in detail through 1937. Colored markers placed on legs and tails served to identify individuals in the field. On Jan. 1 there were 113 birds in 4 coveys. Extra-covey movements were restricted by inter-covey social barriers. During late Feb. and Mar. (mating season) yearling birds wandered extensively beyond the covey boundaries, effecting a 50% reduction in population on the winter territories. Mated pairs left the coveys for nesting early in April. Summer movements, normally restricted by nesting ties, occurred following nest failure or loss of mate. Despite early displays of social intolerance amongst broods, 4 coveys developed during the fall and half of the original birds were relocated on the territories of the preceding winter.—*J. T. Emlen, Jr.*

10819. ERICKSON, ARNOLD B. Beaver populations in Pine County, Minnesota. *Jour. Mammal.* 20(2): 195-201. 1939.—A survey of the beavers (*Castor canadensis*) in the St. Croix State Park, Pine County, Minnesota, was carried on during June, July, and Aug. of 1936 and was completed during these months in 1937. The park, which consisted of 43.6 sq. miles in Nov. 1937, is well watered by creeks, brooks, and ponds, many of which furnish a suitable environment for beavers. The 43.6 sections of land were type mapped so that the amt., condition, and availability of aspen (*Populus tremuloides*) might be known. The condition of aspen and water, and evidence from trapping appear to warrant an estimate of 7 beavers per lodge. Since there are 824 acres of aspen (700 trees per acre) within 300 feet of water, there are 576,800 trees available for beaver food. There are about 43 miles of stream and 36 acres of pond in the park, and the beaver population is 198 animals or 3.45 per mile of stream and 0.85 per acre of pond. There are 33 active dams and 21 active lodges and 41 inactive dams and 9 inactive lodges. The distribution of dams and lodges is shown on a map.—*A. B. Erickson.*

10820. HAMERSTROM, F. N. Jr., and JAMES BLAKE. Winter movements and winter foods of white-tailed deer in central Wisconsin. *Jour. Mammal.* 20(2): 206-215. 1939.—Deer (*Odocoileus virginianus*) on the Central Wisconsin Game Project, Necedah (100,000 acres of sand and drained peat) were studied between Jan. 1936 and July 1938. Winter concs., instead of true yards, are formed, often in the same places year after year. Winter concs. form at a weekly average temp. of about 20° F and break up at a return to the same temp. level, but each movement has its vanguard and its laggards. Of 40 concentration areas, 14 were in jack pine, 21 in jack pine and scrub oaks, 2 in oak woods without conifers, and 3 in tamarack or tamarack-black spruce swamps. Small marshes and brushy swales were interspersed throughout all but the 4th type; these,

plus similar bordering zones up to 60 rods in width, were the feeding areas. Large open marshes and large aspen and willow flats were avoided in winter. Winter foods, which are discussed in some detail, were more than adequate in most of the conc. areas but were inadequate in a few. Food shortage was associated with deer density rather than with cover type. General life history notes for the other seasons are summarized.—*F. N. Hamerstrom, Jr.*

10821. HAMILTON, W. J. Jr., and RUSSELL P. HUNTER. Fall and winter food habits of Vermont bobcats. *Jour. Wildlife Management* 3(2): 99-103. 1939.—Stomachs of 140 bobcats taken in Vermont from fall to late winter over a 3-year period were examined. The results indicate that the chief food of the bobcat consists of deer (probably much of it carrion), mice (chiefly *Microtus* and *Peromyscus*), varying hares and cottontails, porcupines, squirrels, grouse, shrews, muskrats, carrion, and blue jays. Less frequent items are red and gray foxes, grass, poultry, fishes, mink, and insects.—*Authors.*

10822. HATFIELD, DONALD M. Winter food habits of foxes in Minnesota. *Jour. Mammal.* 20(2): 202-206. 1939.—Examination of stomach contents of 58 gray foxes (*Urocyon cinereoargenteus*) and 34 red foxes (*Vulpes fulva*) revealed that rodents and lagomorphs form 56.5% of the total bulk of winter food for the gray fox, and 69.2% of the bulk for the red fox. In bulk per cent, pheasants (*Phasianus colchicus*) comprise 6.6 for the gray and 4 for the red fox. So far as winter diet is concerned, foxes in Minnesota are more beneficial than harmful.—*D. M. Hatfield.*

10823. KING, RALPH T. The essentials of a wildlife range. *Jour. Forestry* 36(5): 457-464. 1938.—A wildlife management program should include inventory, census, yield determination, diagnosis, and control. Inventory determines the spp. present and their distribution, not only of the animals to be managed but also of their food and cover plants, and competitors. Censusing relates to quantities and also should be broadly inclusive; interspersed and juxtaposition of environmental elements are part of this field. Yield determinations involve the annual productivity of all factors. Diagnosis determines whether wildlife populations are, or are not, as they should be; essential steps are (1) recognition of the factors operating against the various spp., (2) evaluation of the effects of these factors, and (3) identifying limiting factors. Control measures consist for the most part of modifications of the environment. Environmental factors embrace essentials and non-essentials; the latter may be recognized but in practice ignored. Essentials are the entities: foods, coverts, and water resources, and their patterns: juxtaposition, and interspersed. Home range for any creature must contain all of the species requirements for both sexes and all age classes for all seasons and for all of the animal's activities. Even if all requirements are present, they do not constitute habitable range unless they are distributed in such a manner that every one of them occurs within the cruising radius of the animal concerned. Carrying capacity does not depend solely upon available quantities of resources but also on their interspersed so that they will serve the varying units of range as determined by specific population saturation levels. Maximum productivity can be attained only when all essentials are at optimum.—*Courtesy Wildlife Review.*

10824. SCOTT, THOS. G., and LYLE F. SELKO. A census of red foxes and striped skunks in Clay and Boone counties, Iowa. *Jour. Wildlife Management* 3(2): 92-98. 1939.—A census technique for red foxes (*Vulpes regalis*) and striped skunks (*Mephitis m. avia*) developed in Clay and Boone Counties, Iowa, is discussed. The data evidenced the following populations: Clay County, foxes, 117; skunks, 945; Boone County, foxes, 351; skunks, 2,331. The numbers of these fur-bearers appeared to vary with the acreage of land having certain slopes. Slopes under 5 to 10% and bottom lands appeared largely unattractive to breeding animals of these species.—*T. G. Scott.*

10825. SIMMONS, J. R. Feathers and fur on the turnpike. 148p. 10 pl., 3 fig. Christopher Publishing House: Boston, 1939. Pr. \$1.75.—This is a natural history study over a period of ten years of the destruction of wild life on the highways of New York and New England. An

enumeration of 3,203 fatalities places robins (375) first in the list of birds with the English sparrow (351), field sparrow (296), and song sparrow (171) also well represented. Pheasants (36), considering their numbers are particularly vulnerable as compared with the bobwhite (7). Even the swift ruby-throated humming bird (1) is sometimes hit. Among mammals the cottontail (337) leads the list with the skunk (222) a close second. Immature animals form about 30% of the total. The death curve rises rapidly in July and August as the young become more abundant. The average number of casualties in 1,105 miles was 0.13 per mile. Birds come to the highway for grit and dusting. Mammals come as scavengers or for travel. Increased speed of cars is increasing the toll of wild life. The book includes a résumé of current trends in conservation and wildlife management and discusses the effects of silviculture and the training of the wildlife conservationist.—*C. A. Kofoed.*

10826. SPERRY, CHARLES C. Food habits of peg-leg coyotes. *Jour. Mammal.* 20(2): 190-194. 1939.—Comparison of the food of 161 "peg-leg" coyotes (coyotes that have lost part or all of one foot) with that of normal coyotes, based on the analyses of 8,263 stomachs. The stomachs were collected over a 7-yr. period in 17 Western States. Vegetable food forms 2% of the total food eaten in each case and includes similar items. Little variation either in nature or in volume was found in minor items of animal food. 9/10 of the total food was composed of 4 items—carrion, domestic stock, rabbits, and rodents. Peg-legs consume appreciably more carrion and domestic stock, and notice-

ably less rabbits and rodents, than do the normal animals.—*C. C. Sperry.*

10827. WHITAKER, H. L. Fox squirrel utilization of Osage orange in Kansas. *Jour. Wildlife Management* 3(2): 117. 1 pl. 1939.—In eastern and central Kansas the seeds of *Maclura pomifera* are favored food of *Sciurus niger rufiventer*. The large trees furnish summer nesting sites, and the hedges serve as satisfactory feeding and refuge cover. Year-round residence depends upon the presence of mature trees of large species that decay readily to make hollows suitable for winter quarters.—*H. L. Whitaker.*

10828. WIGHT, H. M. Field and laboratory technic in wildlife management. viii+107p. 34 fig. University of Michigan Press: Ann Arbor, 1939. Pr. \$1.50.—This manual is used in the course in Wildlife Management in the School of Forestry and Conservation in the Univ. of Michigan and utilizes materials and environments available in the state of Michigan. It discusses the scientific method; extensive and intensive observational methods; recording notes; cover maps; census methods for birds, mammals, fish, and insects; collecting birds, large and small mammals with various types of traps; animal records and specimens, measurements, pathological material, marking, determination of age and sex, and sex ratio; preparation of bird and mammal skins; research on food habits; records of activities of animals; life histories, and matters of general technic such as animal signs in the field, identification of hair, measurement of physical and biotic factors in the environment including cover and food.—*C. A. Kofoed.*

BIOLOGICAL ABSTRACTS

Editor-in-Chief, JOHN E. FLYNN; Assistant Editor, JEAN MACCREIGHT

VOLUME 13

OCTOBER, 1939

NUMBER 8

Entries 12461-14312

GENERAL BIOLOGY

Editors: A. H. GRAVES, *Plant*; C. A. KOFOID, *Animal*

(See also in this issue Entries 12492, 12564, 12565, 12591, 12639, 13823, 14289, 14368)

PHILOSOPHY OF BIOLOGY

12461. ALVERDES, F. Finalität, "Zweckmässigkeit" und biologischer "Sinn." *Zool. Anz.* 126(5/6): 117-125. 1939.—An attempt to clarify these biological concepts. Purposiveness (Zweckmässigkeit) need not have teleological implications but may be limited to anything of survival value. Finality is usually taken to mean that the result of a final process must always be advantageous. This, however, interprets nature too idealistically. Finality expresses itself in the directiveness and future applicability of a series of processes but need not involve vitalistic interpretations nor the idea of a preconceived goal. The biological concept of significance (Sinn) has both subjective and objective connotations. The 1st involves immediate benefit, the 2d the end result; both like finality concern the future result of present processes. Finality and significance concern not only the individual but the phylogenetic sequence (directive evolution); they are not necessarily adaptive or of survival value. The organism attempts to establish an orderliness. Finality, orderliness, and significance in the psychic realm must not be separated from bodily processes, although they also apply to larger units than individuals. Causality and finality are inseparable from life, the one linked with the past, the other with the future. The mechanistic view that causality alone is objective and hence alone worthy of scientific investigation cannot hold since causality like other biological concepts is psychological, carrying the implication that man can eventually solve all the problems of nature. One must be on guard against double meanings of concepts like the above used in biology.—*L. H. Hyman.*

12462. SLICHTER, CHARLES S. *Science in a tavern. Essays and diversions on science in the making.* ix+186p. Frontispiece. University of Wisconsin Press: Madison, 1939. Pr. \$3.—This is a collection of 10 essays and addresses by a mathematician, dealing with the historical, educational and humanistic relations of scientific subjects, among them the origin of the Royal Society and The Club of London. An essay on polymaths, technicians, specialists and genius reviews the work, methods, and scientific significance of the types represented by Helmholtz, Wren, Lord Kelvin, and Heaviside. One essay sets forth the significance of Newton's *Principia* for the evolution of the sciences, another surveys the current tendencies of all sciences to become mathematical and notes the inadequacy of this approach to reality. A review of modern industrialism and its cure savors of holism. A critique of science and authority evaluates the natural sciences as a free arena for the fight in defense of freedom in research and for scientific rectitude. In a group of three Phi Beta Kappa addresses one reviews the rise of Gresham College in its relation to the history of science and the origin of the experimental method, another the self-training of the teacher, and the last the cultural value of the long view and the recognition of wholes, not merely parts.—*C. A. Kofoid.*

MICROSCOPY, INSTRUMENTS, TECHNIQUE

12463. APGAR, CHARLES S. Jr. Notes on telephoto manipulation. *Jour. Biol. Photogr. Assoc.* 7(4): 156-158. 1939.—Suggestions for taking distant motion pictures of animals in their natural habitats.—*O. W. Richards.*

12464. HARDING, F. R. Photographic technic, new

processes, and equipment. Random notes on the production of silent medical motion pictures. *Jour. Biol. Photogr. Assoc.* 7(4): 168-174. 1939.

12465. McCOMB, S. J. Dual camera mounting for gross specimen photography. *Jour. Biol. Photogr. Assoc.* 7(4): 152. 1 pl. 1939.—A home-made bracket attaches a Contax camera and focusing attachment to a viewing camera so that color pictures may be made with the Contax with a minimum of extra work.—*O. W. Richards.*

12466. RICHARDS, OSCAR W. Motion pictures of biological interest. *Jour. Biol. Photogr. Assoc.* 7(4): 159-167. 1939.—A review of the types of films used in teaching and research, equipment, standards, sources and problems of distribution from the experience of the Committee on Motion Pictures of this Association.—*O. W. Richards.*

12467. ZIMMER, STELLA. A modern photographic division. *Jour. Biol. Photogr. Assoc.* 7(4): 153-156. 1 pl. 1939.—A detailed description of the rooms and equipment of the Photographic Division of the new College of Medicine at Syracuse University.—*O. W. Richards.*

TAXONOMY AND NOMENCLATURE

12468. WHEELER, LOUIS CUTTER. Additions and amendments to the international rules of botanical nomenclature. *Amer. Midland Nat.* 21(2): 526-529. 1939.

CONSERVATION AND NATURE STUDY

12469. STEWART, P. M. *Travel and sport in many lands.* 320p. 33 pl. Keystone Library. Thornton Butterworth, Ltd.: London, 1939. Pr. 5s.—A reprint of the 1928 edition giving accounts of hunting grizzly bears in Alaska; big-game hunting in Rhodesia and Tanganyika; shark fishing from the shore at Sydney, Australia; angling for the introduced rainbow trout in the rivers of New Zealand; notes on the plant and animal life of Java; brief accounts of tiger hunting in India and of the monkey temple at Benares; an account of the work of elephants in lumbering in Burma; hunting bighorns and wild goats in the Cassiar, caribou in British Columbia, and black bear in Alberta; angling in English waters with some statistics on the results of the introduction of rainbow trout in controlled waters; and notes on hunting and fishing in Florida.—*C. A. Kofoid.*

TEXTS AND EDUCATION

12470. KÜHN, ALFRED. *Grundriss der allgemeinen Zoologie.* 6th ed. rev. and enlarged. ix+274p. 208 fig. Georg Thieme: Leipzig, 1939. Pr. 11.90M.—A short introductory chapter on the general properties of organisms and the problems of Zoology is followed by the main body of the book which consists of 3 chapters on morphology, physiology and embryology. Ecology and evolution are briefly discussed in the last 2 chapters. The emphasis throughout is on fundamental principles, main problems, and chief results, with sufficient detail in description and illustrative figures and diagrams to give a concise comprehensive survey of the whole field of modern Zoology.—*A. H. Hersh.*

MISCELLANEOUS

12471. BOULENGER, E. G. *Keep an aquarium.* 80p. 9 col. pl., 1 fig. Ward, Lock and Co., Ltd.: London, 1939. Pr. 2s.—This popular guide gives directions for setting up an

aquarium and a garden pond with instruction regarding temps., cleaning, aerating, stocking, enemies, parasites, diseases, foods, and feeding. A chapter on cold water fish discusses various strains of goldfish and carp, and European freshwater fishes suitable for aquaria. The chapter on tropical fishes discusses 24 of the major types available for aquarium culture. 400 spp. are to be found on dealer's lists.—*C. A. Kofoid.*

12472. NEWCOMER, E. J. Cooperation in scientific work. *Jour. Econ. Ent.* 32(3): 471. 1939.—Cooperation in scientific work ought to mean working together to solve some of the problems of humanity. Such cooperation is exemplified by the Western Cooperative Spray Project, an official organization which has helped to standardize horticultural spraying practice through the cooperation of its members.—*E. J. Newcomer.*

12473. SIMPSON, GEO. C., and ANNE ROE. Quantitative zoology, numerical concepts and methods in the study of recent and fossil animals. xviii+414p. 52 fig. McGraw Hill Book Co.: New York, 1939. Pr. \$4.—This is an extensive practical presentation of quantitative methods and their application in the mathematical treatment of biological data. Illustrations are drawn from published work; criticisms applied to the presentation and conclusions; data, in some cases, reworked by approved methods, and the corrected statistical significance indicated. The text presupposes no knowledge of statistical methods, and of mathematics no more than elementary algebra. Numerous examples of the treatment of data are worked out for guidance as to methods and analysis of valid conclusions. Some statistical procedures in common use are inadequate, or even erroneous, and these have been modified or criticized. New concepts of the significance of single specimens are introduced. The authors state that this is a book on methodology in zoology, not primarily on the use of statistics in zoology, although the text inculcates such use. The authors do not follow Fisher in using a double set of symbols and terms, one for the parameters of populations, and one for the calculated estimates of those parameters, regarding such duplication as confusing and repellant to zoological novices. For comparable reasons they exclude the treatment of inverse probability. Formulas for the use of calculating machines are given in an appendix. The computations for the formulas in the text may be made by hand, with a pocket abacus and the slide rule plus a few numerical tables. The chapters deal with types and properties of numerical data, mensuration, frequency distri-

bution and groupings, patterns of frequency distributions, measures of central tendency, measures of dispersion and variability, the normal curve, probability and reliability, sampling, comparison of samples, small samples and single specimens, correlation, regression, association, graphic methods, and growth. Appendices include calculation, symbols, formulas, and the glossary. There are bibliographies of mathematical and statistical, and of biological references.—*C. A. Kofoid.*

12474. STEKEL, WILHELM. *Lettres à une mère.* Traduit de l'allemand par N. ROZENBLIT et L. BAUDOUIN. Collection Psychologie. 9. 2nd ed. 267p. Gaillimard: Paris, 1939. Pr. 22 fr.—This book deals with the psychology of the child in the first years of infancy, the first years of schooling, and of puberty and adolescence. The author discusses the importance of early impressions and the first steps in education, the sense of shame, ambivalence, cunning, a happy atmosphere, the cultivation of independence, early eroticism, avoidance of shock, avoidance of fear, the difficult child, formation of habits, the origin of memory, malingering, the attitude towards additional children, and the use of suggestion. The second part is largely concerned with learning and methods of education and the third with sexual problems and crime.—*C. A. Kofoid.*

12475. VESTAL, PAUL A., and RICHARD EVANS SCHULTES. The economic botany of the Kiowa Indians as it relates to the history of the tribe. With foreword by CLYDE KLUCKHOHN. xiii+110p. Map, 4 pl. Botanical Museum: Cambridge, Massachusetts, 1939.—This is an account of 106 plants used by the Kiowa tribe of N. American Indians determined by current practices and tribal traditions. The scientific, common and Indian names for each are given, the geographical distribution and habitat noted, and the various uses to which the different parts of the plants are put are described. This tribe moved from the mountains in the upper reaches of the Yellowstone and Missouri Rivers eastward into the Great Plains of Wyoming, Nebraska and Colorado, into Oklahoma between 1700 and 1837. With advent of horses they led a nomadic life following the buffalo. These migrations and their trade relations brought them into contact with an extensive and to some extent a changing flora which influenced their economic use of plants. A comparison of Kiowan uses with those of other tribes is made. The ceremonial use of the vision-producing peyote, *Lophophora williamsii*, is of recent origin borrowed from the South since the Kiowas were settled in Oklahoma.—*C. A. Kofoid.*

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 12496, 13220, 13471, 13702, 13805, 13823, 13908)

HISTORY

12476. GUMPERT, M. Dunant; the story of the Red Cross. 323p. Oxford University Press: New York, 1938.

BIOGRAPHY

12477. BUCHHOLZ, JOHN T. Elisha Newton Plank [1831-1907]. *Amer. Midland Nat.* 21(2): 521-525. 1939.—Biographical sketch with portrait of a botanical lecturer, writer and collector of plants in New York, Kansas, Texas, New Mexico and Arkansas, whose collections have found their way into a number of large herbaria.—*J. T. Buchholz.*

12478. FELT, E. P. Wilton Everett Britton 1868-1939. *Jour. Econ. Ent.* 32(2): 350-351. 1939.—Distinguished American entomologist.

12479. HERING, FELIX. Carl Christoph Oettelt. Ein Beitrag zu seiner Lebensgeschichte. *Allg. Forst- u. Jagd-Ztg.* 115(4): 126-133. 1939.—Oettelt (1727-1802) was a pioneer forester in the Duchy of Saxe-Weimar.—*W. N. Sparhawk.*

12480. JANSE, A. J. T. Edward Meyrick. [1854-1938]. *Jour. Ent. Soc. S. Africa* 1: 151-155. Portrait. 1939.—Distinguished British entomologist, known chiefly for his work on the Lepidoptera.

12481. MOORE, GEORGE T., C. STUART GAGER, and FORREST SHREVE. Daniel Trembly MacDougal, Pioneer Plant Physiologist. *Plant Physiol.* 14(2): 191-202. 1 pl., 2 fig.

1939.—Appreciative biographical notes by each of the three authors, in dedication of the April issue of *Plant Physiology* to MacDougal on account of his 75th birthday, March 16, 1939. Edited under the auspices of the Committee on the MacDougal Celebration: Francis E. Lloyd, Homer L. Shantz, Charles A. Shull, Burton E. Livingston. Appended is a selected list of MacDougal's publications (1892-1938) including 120 titles.—*B. E. Livingston.*

12482. NEGRI, GIOVANNI. Pier Antonio Micheli (1679-1737). *Nuovo Gior. Bot. Ital.* 45(1): LXXXI-CVII. 1 pl. 1938(1939).—The "commemorative oration" pronounced at the 50th annual meeting of the Italian Botanical Society at Florence, May 23-29, 1938. It honored the 200th anniversary of the death of Micheli (1737), distinguished Florentine botanist, special student of fungi, mosses, and grasses, traveler and collector, author of the *Nova Plantarum Genera*, an important prelinnaean taxonomic work.—*F. Ramaley.*

12483. NEGRI, GIOVANNI. Don Bruno Tozzi (1656-1743). *Nuovo Gior. Bot. Ital.* 45(1): CIX-CXV. 1 pl. 1938(1939).—Life and writings of Tozzi, student of fungi and flowering plants of Tuscany, author of *Catalogus Plantarum Tuscaniae* (1703) and of other published and unpublished works on botany.—*F. Ramaley.*

12484. VALLENTIN, ANTONINA. Leonardo da Vinci;

the tragic pursuit of perfection. Translated by E. W. DICKES. xii+561p. 35 pl. (4 col.) Viking Press: New York, 1938. Pr. \$3.75.—This life of an astounding man who contributed to the brilliancy of one of the most creative periods of artistic and intellectual accomplishment is of permanent value to all interested in the history of science. It presents the man in his historical setting, with all of its glamour, political intrigue, artistic rivalry, turmoil of standards, and wealth of action in the arts, sciences and technologies which characterized the days of the Borgias, d'Estes, Medicis, Sforzas, and Machiavelli. The order of treatment is chronological, and, as in Leonardo's notebooks, preliminary sketches for his artistic masterpieces are intermingled with anatomical sketches, architectural details, oddments of mechanical plans, and mathematical formulae, so here one finds an olio of marvelously diverse subjects spread over the calendar of his years. The excellent index helps one to note the wealth of his reading of Aristotle, Pliny, Hippocrates, Archimedes, Avicenna, Albertus Magnus, Alhazen, Borelli, Roger Bacon, Ketham, Hero, and Strabo, and his knowledge and use of certain of the fine libraries in Florence. One can find collected accounts of his anatomical investigations in the works of Bottazzi (1910), Lebengarc (1926), and McMurrich (1930); of his botanical studies, in that of De Toni (1922); an estimate of him as an experimentalist, in Favaro (1910); and discussions of various aspects of his interests in technology, in Hart (1925), Semenza (1928), and Heldhaus (1931), but in this book all these are fitted into the running story of his labyrinthine and continuously inspired intellectual activity in its relations to his artistic work and rather catastrophic personal vicissitudes. The modernity of his thinking is revealed in his conception and defense of the scientific method, his attacks

on astrology, his critical discussion of fossils and the deluge and the motion of the sun, and his distrust alike of the metaphysicians and the popularizers of his day. He had a keen appreciation of the emotional in his aphorism "the love of anything is the offspring of knowledge" and clearly comprehended the complementary relations of analysis and synthesis, of the parts and the whole. He also noted that the divisions of science were continually becoming effaced. Light enthralled him, hence "perspective should be placed in the forefront of all humane disquisitions and disciplines." It was the glory of both mathematics and physics. His versatility and the immense power of his creative imagination were his undoing except in the artistic field. He had planned a *Bestiarius*, a great work on *Comparative Anatomy*, a *Treatise on Optics*, a *Treatise on Water*, and a great work on human anatomy, *De Figura Umana*, fortunately in part available from his drawings now in Windsor Castle. Alas at his death not an item of all his researches had been published. The book contains a general bibliography and a full index.—C. A. Kojoid.

12485. ZINSSER, HANS. William Hallock Park, 1863-1939. *Jour. Bact.* 38(1): 1-3. Portrait. 1939.—Appreciation of the personality and work of this distinguished American bacteriologist.

12486. ANONYMOUS. Foreword. *Jour. Nation. Inst. Agric. Bot.* 4(3): 233-234. 1938.—An obituary of Wilfred H. Parker, Director of the Institute of Agric. Botany from 1919-1937, and author of the Foreword to each issue since Jan., 1927.—H. Dorsey.

12487. ANONYMOUS. Professor W. T. MacClement. 1861-1938. *Jour. Fish. Res. Bd. Canada* 4(4): [one unnumbered page]. Portrait. 1939.

BIBLIOGRAPHY

Editors: CLARIBEL R. BARNETT AND EILEEN R. CUNNINGHAM

(See also in this issue Entries 13195, 13980, 14059, 14066)

12488. ABDERHALDEN, EMIL (Editor). Schlusswort, Gesamtinhaltsübersicht, Stickwort- und Mitarbeiterverzeichnis. In: *Abderhalden's Handbuch der biologischen Arbeitsmethoden*. Lieferung 483: xv+324. Urban und Schwarzenberg: Berlin, 1939. Pr. 27 M.—The concluding number of this monumental reference work contains a table of contents (p.1-146) of the articles that make up the 13 volumes, an alphabetical index (p.147-315), and an authors' index to the contributors of articles (over 900 authors participated).

12489. ANAIS da FACULDADE de MEDICINA de PORTO ALEGRE. Vol. 1, no. 1, July-September, 1938. Quarterly. Publ. by the Faculty of Medicine of the Univ. of Porto Alegre, Rio Grande do Sul, Brazil.—Intended mainly as a medium for the publication of papers written by members of the Medical Faculty of the University, the Anais will contain articles on clinical medicine and surgery; reports of activities of the various departments of the University and of the Central Clinical Laboratory; and historical notes, biographies, and news items. There will be a section on bibliography and a review section. The first issue contains the following papers: *Terapêutica atual del desprendimiento de la retina*, by H. ARRUGA; *A concepção fisiológica da Medicina*, by RAUL PILLA; *Considerações gerais sobre o problema biológico da hereditariedade em Oftalmologia*, by CORRÊA MEYER; *Biotipologia feminina*, by MARTIM GOMES; *Aspectos modernos da Criminologia*, by CELESTINO PRUNES; *Novos horizontes anátomo-fisiológicos da circulação*, by GUERRA BLESSMANN; *Considerações sobre um caso de Hipertensão Arterial*, by THOMAZ MARIANTE and MARIO SALIS; *Enfermidade de Hand-Schüller-Christian ou Reticulo-endoteliosa crânio-hipofisária*, by FLORENCIO YGARTUA.

12490. BENNETT, H. Standard chemical and technical dictionary. xli+638p. Chemical Publishing Co., Inc.: New York, 1939. Pr. \$10.—Over 25,000 chemical terms are defined. In addition, tables give the prefix names of organic radicals, the pronunciation of chemical words, the abbreviations and contractions in common use, and the principal chemical, physical and mathematical symbols.

12491. JOURNAL OF ENDOCRINOLOGY. Vol. 1, no. 1, June, 1939. (116 pages). Editor, E. C. DODDS; Assistant Editor, R. L. NOBLE. Editorial Board: P. M. F. BISHOP, C. R. HARRINGTON, G. F. MARRIAN, A. S. PARKES, F. G. YOUNG, and S. ZUCKERMAN. Publ. quarterly by the Oxford University Press, Cambridge, England. 30s. (\$6) per vol.

12492. LANGE, NORBERT ADOLPH (compiled and edited by), and assisted by GORDON M. FORKER. Handbook of chemistry. A reference volume for all requiring ready access to chemical and physical data used in laboratory work and manufacturing. Appendix of mathematical tables and formulas by RICHARD STEVENS BURINGTON. 3rd ed. rev. and enlarged. xviii+1543p.+mathematical appendix of 249p. Handbook Publishers, Inc.: Sandusky, Ohio, 1939. Pr. \$6.—For abstracts of the 1st and 2nd editions see B. A. vol. 9, No. 6, entry 11149, and vol. 11, No. 8, entry 18338, respectively. In the 3rd edition, the text has been rewritten wherever necessary to keep the information up-to-date. E.g., changes in atomic wts. since the appearance of the 2d edition have necessitated revision of several of the tables. The table of vitamins has also been extensively revised, and editorial changes have been introduced to make the whole work more nearly self-explanatory (e.g., better definition of symbols employed, inclusion of definition of many technical terms).

12493. NITARDY, F. W., and MISS E. PICKERING (under direction of). Abstracts of scientific literature having a relation to the official products of the United States Pharmacopoeia, 11th revision. From journals of medicine, pharmacy, chemistry, bio-chemistry, etc. of 1937. v+187p. Publ. by United States Pharmacopoeia Board of Trustees, 1939.

12494. RUWENZORI EXPEDITION, 1934-5. Director, C. FORSTER-COOPER. Vol. I, No. 1. Introduction with list of localities. 9p. 2 maps, 20 pl. Publ. by British Museum of Natural History: London, 1939. Pr. 2s 6d.—Suggestions by members of the Uganda Government Service and others as to the need of a floral and faunal survey of the high mts. of British East Africa led to the sending of an

expedition by the British Museum, under the leadership of Dr. F. W. Edwards (entomologist) and Dr. G. Taylor (botanist), which explored these mountains from Sept., 1934 to March, 1935. A popular account of this exploration has been given by P. M. Synge, one of its members, in a book "Mountains of the Moon" [see B. A. 12(4): entry 5814]. Formal publication of the results of this expedition will comprise a series of volumes of which several sections have already appeared, dealing with the various insect groups so far studied. The first issue (Vol. I, No. 1) presents the general geographical and zoogeographical findings, with a map, a list of localities and the collectors who worked at each of these, and a series of 20 plates showing characteristic features of terrain and vegetation.—So far as the insects collected are concerned, there is little local endemism in the different valleys. Pronounced altitudinal stratification was found, corresponding with the vegetational and climatic zones. Among the Diptera and Lepidoptera a strong Palaearctic element was found in the zones above 10,000 ft. altitude. As is the case with other high mountain areas, numerous brachypterous species of insects were found; but there was no other evident adaptation to mountain conditions.—At date of abstracting, the following other issues have appeared (each to be abstracted separately): 1(2/3), Pr. 2s 6d., comprising 2 articles—SIMULIIDAE, by E. G. GIBBINS, and MOSQUITOES, by F. W. EDWARDS and E. G. GIBBINS; 1(4), Pr. 2s 6d., 1 article, PSYCHODIDAE, by A. L. TONNOIR; 1(5), Pr. 2s 6d., comprising 1 article, CERATOPOGONIDAE, by J. W. S. MACFIE; 3(1), Pr. 2s 6d., comprising 1 article, TRICHOPTERA, by M. E. MOSELY; 3(2), Pr. 1s, comprising 1 article, SIPHONAPTERA, by K. JORDAN; 3(3), Pr. 5s, comprising 1 article, RHOPALOCERA, by A. G. GABRIEL; 3(4), Pr. 1s, comprising 1 article, LYMANTRIIDAE, by C. L. COLLENETTE; and 3(5), Pr. 1s, EPHEMEROPTERA and NEUROPTERA, by D. E. KIMMINS.

12495. SHOUP, CHARLES S. An annotated bibliography of the zoology of Tennessee and the Tennessee Valley

region. *Amer. Midland Nat.* 21(3): 583-635. 1939.—This bibliography comprises approx. 1,000 titles of papers dealing directly or indirectly with the distribution and identification of species of the area. An index of 216 localities from which collections have been reported is appended to the list.—C. S. Shoup.

12496. SOLLA, RUGGERO. La Dendrologia di Ulisse Aldrovandi. [The Dendrology of Ulysses Aldrovandi.] *Nuovo Gior. Bot. Ital.* 46(1): 88-100. 1939.—A précis of the "Dendrology" of Ulysses Aldrovandi (1522-1605), celebrated for his publications in natural history and founder (1568) and director (1568-1602) of the botanical garden of Bologna. The work, better known to botanists by its title than for its contents, was published 60 years after the author's death. It deals with such topics as anatomy, terminology and nomenclature, trees in history, literature, and fable, tree products used in medicine, for building, furniture-making, and ship construction, trees which produce edible fruits and their cultivation.—F. Ramaley.

12497. TELLINI, GIOVANNA. Un erbario figurato della fine dell' 500. [An illustrated herbal of the late sixteenth century.] *Nuovo Gior. Bot. Ital.* 45(1): XLIX-LXIII. 3 fig. 1938(1939).—A 68-page volume, dated at Pisa, August 21, 1585, figures 106 spp. using vernacular names. The title-page states that the book is by "Tomasso di Franchio di Leonardo da Motaione" and is a book "for learning herbs and other things." Although the pen drawings are crude it is possible to identify all but about 10 of the plants as to their genus, and a considerable number even to the species. Among them are *Nymphaea alba*, *Verbascum thapsus*, *Paeonia officinalis*, *Papaver somniferum*, *Hedera helix*, *Humulus lupulus*, *Cannabis sativa*, *Anchusa officinalis*, etc.—F. Ramaley.

12498. ZEITSCHRIFT für ALTERSFORSCHUNG: Organ für Erforschung der Physiologie und Pathologie der Erscheinungen der Alterns. Vol. 1, no. 1, July, 1938. Editors, E. ABDERHALDEN, and M. BÜRGER. Published by Theodor Steinkopff, Dresden, Leipzig. Irregular. 400p. per vol. Pr. 30M.—R. R. Willoughby (courtesy of Psych. Abst.).

EVOLUTION

(See also B. A. 13(7): Entries 10671, 10775, 12036, 12151, 12313; and in this issue 12506, 12514, 12516, 13002, 14291)

12499. GUYÉNOT, E. La renaissance du transformisme. *Rev. Sci. [Paris]* 77(1): 30-38. 1939.

12500. LUDWIG, W. Beitrag zur Frage nach den Ursache der Evolution auf theoretischer und experimenteller Basis. *Zool. Anz. Suppl. (Verhandl. deutsch. zool. Ges.)* 11: 182-193. 1938.—There are 4 theories of the method of evolution: neo-Darwinism or the selection of chance variations, Berg's theory of limited mutability, mutability induced by environmental factors but not correlated with those factors, and Lamarckism or induced correlated mutability. Probably natural selection alone can bring about evolutionary progress but it is necessary to postulate a positive selection value for every new character from its first appearance.

An induced mutation may occur in far greater frequency than the usual chance mutations and may involve the entire population; such mutations are effective even if of neutral or disadvantageous character. Selection, however, has some action in the case of induced mutations, eliminating those which failed to respond to the inducing factor. The importance of natural selection diminishes in the order from neo-Darwinism to Lamarckism. In a Lamarckian expt., the author has cut off the wings and halteres from a wild-type *Drosophila* race within 6-8 hrs. after hatching for 120 generations. No change in wing musculature has been observed.—L. H. Hyman.

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. McCLUNG, *Animal*

(See also in this issue Entries 12505, 12517, 12528, 12536, 12538, 12555, 12698, 13171, 13327, 13343, 13722, 13725, 13727, 13760, 14197)

PLANT

12501. ERNST, HANS. Meiosis und Crossing-over. Zytogenetische Untersuchungen an *Antirrhinum majus* L. *Zeitschr. Bot.* 34(2): 81-111. 1939.—Cytological investigation of strain 50 of *A. majus* shows 8 characteristic chromosomes in the species, 2 long (one with a sub-terminal chromomere), 5 medium long (one nucleolus-forming) and one short. Röntgen rays have the effect of reducing the number of chiasmata at diakinesis. Structural changes in the chromosomes as a result of the ray treatment were cytologically visible. The 1937 results of cold treatment on the number of diakinesis end-connections have been confirmed and longer treatments enable more exact statements to be made

on the effect of cold in reducing connections. The effect is due not to reduced pairing but to temp. shock effects on the prophase chromosomes, leading to a reduction of crossing-over. In the case of the Aur-Marm linkage, the diakinesis end-connection values of the temp. expts. may be plotted against cross-over values in parallel genetic expts.; these show that with rising fall in end-connections, the cross-over values do not fall off correspondingly rapidly. Cytological investigations on 4 *Antirrhinum* spp. hybrids show normal pairing in pachytene, but in diakinesis a reduced number of end-connections, which is in agreement with Kühn's findings of lower cross-over values in such crosses.—J. H. Priestley.

12502. FRANCO, COARACY M. Relation between chromosome number and stomata in *Coffea*. *Bot. Gaz.* 100 (4): 817-827. 1939.—Using the strip method of collecting, stomatal counts and measurements of stomatal area were made. The average number of stomata per sq. mm. and areas of stomatal openings were subjected to Fisher's "t" test (for determining the significance of the mean). Various spp. and vars. of *Coffea* with diploid, triploid, tetraploid, pentaploid, hexaploid, and octoploid chromosome complements were examined as to stomatal number and stomatal area. The number of stomata in *Coffea* decreases as the number of chromosomes increases; the size of the leaves has no influence on the number of stomata; and the area of the stomatal openings varies with the species and directly with the number of chromosomes.—W. G. Houk.

12503. GAVAUDAN, P., N. GAVAUDAN, et J. F. DURAND. Sur les anomalies de la caryocinèse et de la cytodièrese provoquées par le naphtalène et les β naphtyl-éthers. *Compt. Rend. Soc. Biol.* 130(12): 1234-1237. 1939.—Young roots of *Triticum vulgare* and *T. monococcum* were exposed to the vapors of the perfumes "Yara-Yara" (β -naphthyl-methylether; F. +73°) and "Bromelia" (β -naphthyl-ethylether; F. 37°) in Petri dishes maintaining sufficient humidity. The 2 derivatives are much less toxic than the hydrocarbon itself but act on karyokinesis in the same manner, although less intensely. Both aryl esters alter the achromatic apparatus, anaphases and telophases becoming very irregular. In spite of marked dicentricity the separation into 2 daughter-nuclei is often incomplete. Multipolar figures formed by 3 or 4 groups of chromosomes indicate a sort of dissociation of the spindle. As regards cytodyeresis, the most striking phenomenon is a change of orientation of the plane of cell division to one which is oblique or perpendicular to the normal plane.—H. Simons.

12504. HAGERUP, O. A peculiar asymmetrical mitosis in the microspore of *Orchis*. *Hereditas* 24(1/2): 94-96. Illus. 1938.

12505. IYENGAR, N. K. Cytological investigations on the genus *Cicer*. *Ann. Botany* 3(10): 271-305. 1 pl., 87 fig. 1939.—An examination of the root-tips of 30 vars. of *C. arietinum* showed 16 chromosomes in each case. No morphological differences were noticed. The root-tips of 2 vars. of *C. soongaricum* showed 14 chromosomes, which were found to be uniformly much bigger than in *C. arietinum*. This indicates the possibility of 2 polyploid series within the genus *Cicer*, as in *Ranunculus*. The resting nucleus of *C. arietinum* showed conspicuous prochromosomes which were not seen in *soongaricum*. In *C. arietinum* 4 prochromosomes are attached to the nucleolus in the resting nucleus and 4 chromosomes to the nucleolus in somatic prophase. In the somatic metaphase 4 satellites are seen. In *C. soongaricum* 4 satellites are present, 2 small and 2 large. This indicates allopolyploidy in these species. Irregularities in the somatic division, as somatic doubling, lagging chromosomes, and persistence of the nucleolus in the metaphase were observed. Somatic pairing occurred in both species. The prochromosomes are the persistent portions of chromosomes on either side of the spindle attachment region. The cycle of mitosis and meiosis in the nuclei showing prochromosomes is identical with the nuclei without prochromosomes. The special features of meiosis in *C. arietinum* are an extreme diffuse stage in diplotene, and secondary association in Metaphase I. An analysis of secondary association in Metaphase I shows a maximum association of $1(3)+2(2)+1(1)$, indicating that 4 is the basic number. Segmental interchange has also probably played a part in the evolution of this species. *C. arietinum* is an allotetraploid with structural changes. The attachment of 4 chromosomes to the nucleolus in the leptotene and 2 bivalents in zygotene, pachytene, and diakinesis is another indication that duplication of chromosomes has taken place in *C. arietinum*. Irregularities in meiosis, as failure of pairing, non-congression and non-orientation of the bivalents on the metaphase plate, premeiotic non-disjunction, and cytomitosis were seen.—Auth. summ.

12506. KÖNIG, DIETRICH. Die Chromosomenverhältnisse der Deutschen Salicornien. *Planta* 29(3): 361-375. 10 fig. 1939.—All forms with 18 somatic chromosomes show much branching and a uniform floral morphology. They

are inhabitants of the inland coastal regions. All forms with 36 chromosomes show less branching and have within the group uniform floral morphology. They inhabit the salty marshes. In the Salicorniae, as well as in other groups, polyploidy is a derived condition whereby the genus has conquered a new set of ecological difficulties.—B. R. Nebel.

12507. MÜNTZING, A. Sterility and chromosome pairing in intraspecific *Galeopsis* hybrids. *Hereditas* 24(1/2): 117-188. 1938.

12508. RESENDE, FLAVIO. Über das Verhalten des Sat-Fadens. *Planta* 29(2): 306-313. 3 fig. 1939.—The length of the satellite thread at any stage is independent of the size of the nucleolus in telophase. In *Aloe mitriformis* the satellite thread elongated spontaneously in anaphase before a nucleolus started to condense. In *Cyclanthera explosens* a resting nucleus was observed in which a satellite thread was very much elongated.—B. R. Nebel.

12509. SEARS, E. R. Cytogenetic studies with polyploid species of wheat. I. Chromosomal aberrations in the progeny of a haploid of *Triticum vulgare*. *Genetics* 24(4): 509-523. 1 pl. 1939.—Of 13 plants obtained from the haploid by applying pollen from diploids, 11 had abnormal meiotic associations. A total of 16 univalents, 5 trivalents, and 2 rings of four were present in the 11 individuals, of which the most aberrant had 2 univalents, 2 trivalents, and 1 ring of four. Although most of the aberrant plants differed from normal in morphology, color, size, or vigor, seeds were obtained on all 11. In the selfed progeny of 2 monosomic plants, nullosomics were obtained, of which one was fertile and one nearly sterile. A tetrasomic offspring of one trisomic plant was phenotypically normal. Crosses of *T. durum* with 8 monosomics of different origin showed that 5 of the 8 involved a chromosome homologous to one of those of *T. durum*. Rings of four were evidently the result of reciprocal translocations, which probably occurred in the haploid as crossovers between paired, partially homologous chromosomes.—E. R. Sears.

12510. WITSCH, HANS v. Zum Feinbau der Zellwand in Wurzeln. *Planta* 29(3): 409-418. 1939.—Polarized light was used and plasmolysis employed to study the submicroscopic structure of the walls of the cortical parenchyma of various types of roots. Roots which do not thicken retain a tubular structure of the cells. Roots which increase in girth show a laminated structure of the cell walls. Contractile roots have cell walls of a fibrous type. Differentiation does not occur until the secondary peripheral layers are formed. At the start the meristems of all 3 groups have tubular structure. Fixation with 80% alcohol may change the submicroscopic structure, also the true double refraction of cellulose walls may, in the living, be decreased or overshadowed by double refraction due to tension.—B. R. Nebel.

ANIMAL

12511. LEVENSTEIN, IRVING. The cytology of the pituitary gland of two varieties of goldfish (*Carassius auratus* L.), with some reference to variable factors in the gland which may possibly be related to the different morphological types. *Zoologica [New York]* 24(1): 47-60. 1 pl. 1939.—The pituitary of the "common" goldfish was compared with that of the "telescope moor," a form of *C. auratus* with a short, blunt body which is rounded and egg-shaped, black, with stalked, projecting eyes, paired ventral fins and divided tail. These forms represent extremes in morphological development of *C. auratus*. The pituitary of the "common" var. is larger than that in a comparable "moor." This difference may be related to the arrangement of the bony structures. The transitional lobe in the "moor" contains (after Masson's) more heavily granulated and intensely staining eosinophiles than does that lobe in the "common." Differences in numbers and distribution of chromophiles exist in comparable sections of the gland. The Golgi configuration is similar in corresponding cells of both vars. No differences are apparent in the intermedia of the black pigmented "moor" as against the gold "common." Gross relationships of the gland and morphological divisions (Bell '37) were confirmed for the "common" var. and there appears to be no apparent variations of these parts in the "moor." The Golgi network

of the intermedia cells completely surrounds the nucleus. A compact Golgi caps the transitional lobe eosinophiles. In the basophiles the network touches the nucleus on one side but ramifies out into the cytoplasm. In the chromophobes both types of Golgi are found. This condition is strikingly similar to that found in the mammals (Severinghaus, '32).—*I. Levenstein.*

12512. MORGAN, T. H. The effects of centrifuging on the polar spindles of the egg of *Chaetopterus* and *Cumingia*. *Biol. Bull.* 76(3): 339-358. 2 pl. 1939.—Eggs of *Chaetopterus* and *Cumingia* were centrifuged at various speeds either before or after the polar spindle had come to the surface in order to find out whether, if the spindle were held in the center of the egg after the time when it would normally come to the surface, it would still move to the periphery of the egg or remain in the interior. Under certain circumstances, depending on the speed or on the time on the centrifuge, the chromosomes remain in the center of the egg and uniting there with the sperm chromosome give rise to a pentaploid embryo. Under other circumstances the spindle comes to the surface and gives rise to 1 or 2 polar

bodies; if to one only this egg, after fertilization, will be triploid. Only rarely was a case found in which the polar spindle might be interpreted as dividing the egg.—*T. H. Morgan.*

12513. YEAGER, J. FRANKLIN. Apparent nuclear-cytoplasmic transfer in some insect blood cells. *Ann. Ent. Soc. America* 32(1): 49-57. 2 pl. 1939.—The blood of the southern army worm (*Prodenia eridania*) contains cells which exhibit various stages in the apparent protrusion of nuclear material into the surrounding cytoplasm. With the Wright-nicotine-oxalic acid and with the Feulgen technique the protruding and detached masses appear to be the same as the chromatic masses of the nucleus and, like the nuclear chromatin, contain thymonucleic acid. The significance of these observations must await future investigation but several possible explanations are listed. Although the extrusion of nuclear material in insect blood cells is thought not to have been reported before, this process in certain other cells has been described by a number of workers. There is a brief survey of the literature on this subject and a bibliography of 9 references.—*J. L. Buys.*

GENETICS

Editors: ORLAND E. WHITE, *Plant*; SEWALL WRIGHT, *Animal*

(See also in this issue Entries 12501, 12502, 12503, 12506, 12507, 12509, 12570, 12758, 13109, 13196, 13203, 13213, 13262, 13329, 13332, 13337, 13341, 13349, 13386, 13411, 13520, 13527, 13744, 13759, 13797, 13806, 13807, 13811, 13817, 13821, 13823, 13829, 13830, 13831, 13843, 13846, 13878, 13890, 13945, 14013, 14083, 14084, 14086, 14089)

GENERAL

12514. BIER, AUGUST. Neue Gesichtspunkte in der Vererbung. 70p. Julius Springer: Berlin, 1938. Pr. 3.60M.—The author believes he has obtained the transformation or "transmutation" of the species *Lupinus luteus* into 2 distinct spp., *L. polyphyllus* and *L. angustifolius*. Seeds were obtained from an estate on which *L. luteus* had once been grown, but which was planted in 1869 with pine trees, and was not ploughed again until 1924,—55 yrs. later. The seeds had apparently remained in the ground during this time. The seeds were smaller and harder than normal, but after scratching 100% germination was obtained. Of 2,700 seeds planted in 1924-25, and determined previously to be *L. luteus*, 5 produced plants resembling *L. polyphyllus*. Offspring from one of these were all typical *L. polyphyllus*. Other plantings of seed from the same source produced small percentages of plants resembling *L. angustifolius*. In no case were any signs of Mendelian segregation found. In some cases the "transmutation" from one species to another apparently occurred in one generation, in others it went through 1 or 2 intermediate stages. The altered offspring were vigorous, fertile and produced uniform, similar progeny. These transmutations cannot be explained according to the generally accepted principles of heredity and evoke a discussion of the philosophy of Herakleitos and other Greeks in relation to Mendelism and Darwinism. The correct mixing of opposing characteristics and the preservation of the normal rhythm of nature are held to be essential to the maintenance of life. Man is looked upon as a domesticated animal in which natural selection has disappeared, while artificial selection is not practised either. A more rigid régime of training for youth based on Spartan principles is recommended.—*G. L. Stebbins, Jr.*

12515. WADDINGTON, C. H. An introduction to modern genetics. 441p. 5 pl., 160 fig. Macmillan Co.: New York, 1939. Pr. \$4.—This is a comprehensive, unified, dynamic, and interpretative presentation of genetics by an experimental embryologist. The text is organized for a progressive development of subject matter and illustrated by an abundance of selected pertinent examples leading to conclusions of importance or affording evidence of need for further research. The subject is treated under 5 major sections; formal genetics, genetics and development, genetics and evolution, genetics and human affairs, and the nature of the gene. The first section treats of the fundamentals of Mendelism, modifications of the chromosome cycle, behavior of individual chromosomes, linear differentiation of chromosomes, and the mechanics of chromosomes. Section

II discusses genes and development, the interaction of genes, gene-controlled processes, the genetic control of pattern, and sex determination. Section III is concerned with the processes of evolution, the genetic nature of taxonomic differences, and evolutionary mechanisms. Section IV discusses animal and plant breeding, human genetics, and the genetic structure of human populations. Section V elaborates the cytological, developmental, and genetical natures of the gene, gene mutations, and the relations of chromosome and gene. The appendix contains laboratory instructions for class-work on *Drosophila*, an extensive bibliography, and author and subject indexes. Of special general interest are the discussions of the interactions of genes, the genetic control of pattern, the theory of sexuality, the processes of evolution, evolutionary mechanisms, the inheritance of acquired characters, the genetic nature of human populations, and gene mutation.—*C. A. Kofoid.*

12516. WRIGHT, SEWALL. The distribution of self-sterility alleles in populations. *Genetics* 24(4): 538-552. 1939.—A study of the statistical situation in populations of limited size in respect to multiple alleles determining self-sterility according to the mechanism discovered by East and Mangelsdorf in *Nicotiana* and found by S. Emerson in *Oenothera organensis*. There is an automatic tendency toward increase in frequency of the rarer alleles including new mutations, and toward decrease of the more abundant ones with consequent increase in the number carried. This tendency is balanced by loss of alleles due to the accidents of sampling. The formula for the frequency distribution of gene frequencies is derived and used to determine the number of alleles maintained in a population in relation to its effective size and to mutation (or immigration) rate. Application to Emerson's data on a species carrying more than 37 alleles, in spite of small numbers (probably less than 1,000 or even 500), and probable low mutation rate, brings out an apparent discrepancy. One possible explanation is that the species has recently been much larger. Another is that the average mutation rate is much higher than indicated so far. A third possibility is that subdivision into small strongly isolated subgroups increases the number of alleles which are carried. An approximate formula for the distribution under these conditions indicates that if plants are pollinated in 98% or more of the cases by immediate neighbors it would be possible for a species of only 500 individuals to maintain 40 to 50 alleles by mutation rates of the order of 10^{-5} or 10^{-6} per generation.—*S. Wright.*

PLANT

12517. BECKER, CATHARINE L. Inheritance studies in the interspecific cross *Solanum demissum* Lindl. \times *S. tuberosum* L. *Jour. Agric. Res.* 59(1): 23-39. 1939.—The 60-chromosome hybrids showed considerable irregularity in meiosis, non-oriented and lagging chromosomes being usual. 15 plants were raised, of which 3 were fertile enough to produce F_2 families. One F_2 family was practically identical with *S. demissum* in morphological characters and was uniform. The other 2 F_2 families approached *S. tuberosum* in morphological characters and were variable. Chromosome counts in 15 of the plants of one of these families ranged from 48, the number in *S. tuberosum*, to 58, or 2 less than the number in the F_1 plants. In cotyledon measurements, stem diam., heat injury, maturity, frost injury, stolon length, number of tubers, and weight of the largest tuber, these F_2 families showed a range from the extreme of one original parent to the extreme of the other, with the means falling halfway between the parent means. Height of mature plants and internode length of the F_2 families resembled *S. demissum* more than 4-39-2-2, while the weight of the crop was similar to that of the cultivated parent. Terminal leaflets and mature leaves were larger than those of either parent.—C. L. Becker.

12518. BERGSTRÖM, I. Tetraploid apple seedlings obtained from the progeny of triploid varieties. *Hereditas* 24(1/2): 210-215. 1938.

12519. BRIEGER, F. G. [The anthocyanins and their hereditary transmission.] *Jor. Agron. [São Paulo]* 1(2): 107-132. 1938.—A discussion of the chemico-genetical relation of the anthocyanins in *Anthriscum*, *Lathyrus* and *Primula*, based on work done at the John Innes Horticultural Institute, a résumé of which has been published by R. SCOTT-MONCRIEFF.—W. C. Johnstone.

12520. BRINK, R. A., W. KELLER, and C. EISENHART. Differential survival of alfalfa strains under an ice sheet. *Jour. Agric. Res.* 59(1): 59-71. 1939.—Ice sheets, which form on the ground when rain falls at freezing temps., frequently cause great damage to alfalfa in Wisconsin and adjacent states. Very extensive damage resulted from an ice sheet during Jan. and Feb. of 1937 which, however, provided an unusual opportunity to study the reaction of alfalfa to this type of injury in an exptl. plot containing 42 strains, located at Madison, Wis. Madison was in a transition zone between the severely damaged area to the south and east where the ground was bare, and the moderately damaged area to the north and west where the ground was covered by a protective layer of snow when the ice formed. Many of the 42 strains were either self-fertilized selections from Grimm, or their hybrids. The parental lines had been selected on the basis of their cold resistance as measured by an artificial freezing test. Both the Grimm and Hardigan vars. were included as checks. The average mortality on the exptl. plot was 42%, but values for individual strains ranged from 12 to 96%. A statistical study of the data indicates that significant differences in survival between strains occurred and, furthermore, that several strains were more resistant than either Grimm or Hardigan. Strains of hybrid origin were more resistant than their inbred parents.—Auth. summ.

12521. BUTLER, H. F. Tomato importations for breeding. *Proc. Amer. Soc. Hort. Sci.* 36: 674-676. 1938(1939).—This progress report summarizes what was found in 265 importations of both wild and cultivated tomatoes. Several spp. were included. Growth habits, fruit, and extent of defoliation were recorded. The probable value of importations from various countries was noted. Plant importation numbers 126936, 127826, 127827B, 128285, and 127827A were selected by the author as tentative parents to avoid the premature defoliation commonly found in the "Upper South."—B. D. Drain.

12522. DRAIN, BROOKS D. Red raspberry breeding for southern adaptation. *Proc. Amer. Soc. Hort. Sci.* 36: 302-304. 1938(1939).—Southern adaptation was secured by crossing *Rubus kuntzeanus*, an oriental species, on cultivated vars. of red raspberries. To secure commercial quality it was necessary to back-cross on the latter twice. Vars. klendusic to mosaic were secured by using Lloyd George as a parent in the last back-cross. Leaf spot-resistant seedlings were common in the 1st crosses, but few highly re-

sistant ones were located in the 2d back-cross population. This study included over 5,000 seedlings.—B. D. Drain.

12523. EMERSON, STERLING. A preliminary survey of the *Oenothera organensis* population. *Genetics* 24(4): 524-537. 1 fig. 1939.—A partial survey of the habitats and distribution of the species in its restricted native area is reported together with an incomplete analysis of the frequencies and distribution of self-sterility alleles. 37 distinct alleles have been recovered. The author concludes that the total population size is between 500 and 1,000 individuals, that the entire population forms a single interbreeding unit, that seed dispersal occurs chiefly by water, that the transfer of alleles between canyons is accomplished through the pollen and that the majority of flowers are pollinated by mixtures of pollen from several or many different plants.—S. Emerson.

12524. ENIN, T. K. Gibrizatzia Gorokhov v Dele Vyvedenia Novykh Sortov. [Hybridization of peas in the production of new varieties.] *Selektzia i Semenovodstvo [Plant Breeding and Seed Growing]* 2/3. 1939.—The Institute of Vegetable Growing and The Genetic Institute of Soviet Academy of Sciences attempted to hybridize geographically-near as well as geographically-distant vars. of peas. Several improved new vars. were developed, among them "Jegalov," "Mayak" (Lighthouse), "Neistoschimii." These vars. have been declared valuable after a number of tests, and are now being multiplied. The illustrations of the above garden peas, showing the pods, and the seeds are given. Among the peas that were used for crossing are several well known American vars.; "Alaska," "Giant," "Mamont," and "Thomas Laxton."—J. W. Pincus.

12525. GUSTAFSSON, A. Studies on the genetic basis of chlorophyll formation and the mechanism of induced mutagenesis. *Hereditas* 24(1/2): 33-93. 1938.—Reports further results from the investigation of X-raying barley seeds.

12526. HAGERUP, O. Studies on the significance of polyploidy. II. Orchis. *Hereditas* 24(1/2): 253-264. Illus. 1938.

12527. HARVEY, PAUL H. Hereditary variation in plant nutrition. *Genetics* 24(4): 437-461. 1939.—Corn inbreds and hybrids were grown in aqueous mineral cultures supplied with different forms of N. Total dry weight of 5- to 6-weeks-old plants showed statistically significant differential strain response to the nitrate vs. ammonium ion. Hybrids demonstrated definite parent-offspring correlations. Hybrid response was in general intermediate. Efficient ammonium-utilizing strains produced the same percentage of dry matter on either ammonium or nitrate N; inefficient ammonium-utilizing strains failed to produce as high a percentage of dry matter on ammonium as on nitrate N. This indicates better metabolism of ammonium N by the former strains. Significant differences in top-root ratios between strains further demonstrate the individuality of corn inbreds. Tomato vars. and strains of *Lycopersicum esculentum* and *L. pimpinellifolium* responded differentially on high and low levels of N, P, and K nutrient cultures. Hybrids of strains most extreme in K response were tested and showed clearly the inheritance of the complex response for the strain differences.—P. H. Harvey.

12528. HJELMQVIST, HAKON. Notiser från Lunds Botaniska Trädgård. En Silene-Chimär. [Notes from Lund's Botanical Garden. II. A Silene chimera.] [With Eng. summ.] *Bot. Notiser* 1939(2): 291-294. 1 fig. 1939.—In the summer of 1937 the author observed a chimera of *S. fimbriata* and a chlorophyllless form of the same species. Two 4-leaf ranges were on one side normally green; on the other side yellowish white. The epidermis of the white part was normally developed, containing chloroplasts on the lower parts of the leaves. The central part seemed to contain some chlorophyll. It was both a sectorial and periclinal chimera.—T. R. Swanback.

12529. HUTCHINS, A. E. Some examples of heterosis in the cucumber, *Cucumis sativus* L. *Proc. Amer. Soc. Hort. Sci.* 36: 660-664. 1938(1939).—The F_1 of the cucumber crosses tested exhibited hybrid vigor, expressed in increased yield per plant and in increased number of fruits per plant. In these crosses, in which a very early var. was crossed with later vars., the earliness character was expressed in the F_1 in early yields which were much larger than those of the parent vars. There was no difference in the be-

havior of reciprocal crosses insofar as yield per plant in the F_1 was concerned.—A. E. Hutchins.

12530. JOHNSON, L. P. V., and H. A. McLENNAN. An attempt to hybridize annual and perennial *Avena* species. *Canadian Jour. Res. Sect. C* 17(2): 35-37. 1 pl., 1 fig. 1939.—Cross pollination of annual spp. of *Avena* (6 vars. of *sativa*, 2 of *byzantina*, 1 each of *nuda*, *fatua*, *sterilis*, *abyssinica*, *strigosa*, *wiestii*, and *brevis*) with perennial *Avena* spp. (*elatior*, *versicula*, 2 strains of *pubescens*, 6 strains of *pratensis*, 4 strains of *planiculmis*, *montana*, *bluvii* and *compressa*) did not result in the production of hybrid seeds, but certain specific combinations produced ovary stimulation.

12531. JONES, DONALD F. Sex intergrades in dioecious maize. *Amer. Jour. Bot.* 26(6): 412-415. 1939.—Three families of dioecious maize, originating from a combination of known mutant types, have been propagated for 9 generations. All families produce some individuals with a varying degree of ♂ characteristics in the ♀ plants and ♀ characteristics in the ♂ plants. The families differ in the number and character of these sex-intergrades and respond to selection. Sex expression in this material is relatively uninfluenced by the normally fluctuating environment and appears to be governed by internal factors capable of segregation and recombination.—D. F. Jones.

12532. JONES, DONALD F. Continued inbreeding in maize. *Genetics* 24(4): 462-473. 5 fig. 1939.—From 4 original lines of maize 3 have been continuously self-fertilized for 30 generations. One original line and one sub-line, separated in the 2d generation, failed to survive. At least in one case this failure was due to a degenerative change which apparently could not be prevented by selection of normal plants as progenitors. Reduction in height ceased after five generations and in yield after 20 generations. Sib lines separated at various stages clearly differed in some cases and remained the same in others. These differences are considered to be the result of spontaneous transmissible variations and not the result of delayed segregation. After 20 generations of self-fertilization these inbred lines appear to be uniform and constant for all visible characters and homozygous for all loci that have any effect upon hybrid vigor. Throughout the entire period of inbreeding no variations have appeared which could be interpreted as being favorable to survival.—D. F. Jones.

12533. KOPELKIEVSKI, G. P. Novye Perspektivnye Linnii Orsa Shatilovskoi Selektstanzii. [New promising lines of oats at the Shatilov Station.] *Selektzia i Semenovodstvo* [Plant Breeding and Seed Growing] 9(1): 9-12. 1939.—The standard vars. of oats are: A-0315 of Moscow Station, and "Shatilov-056." The Station endeavored to meet the following requirements in their new lines: resistance to rust, smut, and other fungous diseases; to straw lodging, and to shattering; adaptability to mechanized harvesting; high nutritional content (high percentage of protein, fat); and medium maturity. Several new hybrid lines, all of which gave higher yields during the past 4 years' tests are described.—J. W. Pincus.

12534. McKAY, J. W., and H. L. CRANE. The immediate effect of pollen on the fruit of the chestnut. *Proc. Amer. Soc. Hort. Sci.* 36: 293-298. 1938(1939).—Hybridization expts. with 3 spp. of chestnut (*Castanea crenata*, *C. mollissima*, and *C. sativa*) showed that 2 pollens may produce nuts of different size on the same tree. In one case 2 pollens on the same tree produced nuts with mean weights of 18.7 and 27.1 g. respectively. The mean difference of 8.4 g. is $4\frac{1}{2}$ times its standard error and is highly significant. Since the embryo forms the kernel of the chestnut and is the tissue which is differentially affected by various pollens, a clear case of xenia is demonstrated for this genus.—Authors.

12535. ODLAND, M. L., and A. M. PORTER. Inheritance of the immature fruit color of peppers. *Proc. Amer. Soc. Hort. Sci.* 36: 647-651. 1938(1939).—Strains of lettuce green or "yellow" (Hungarian yellow wax and Tabasco), a strain of sulphury white (Ornamental) and strains of cedar green (Oshkosh and Red Cherry) were used in the study. The lettuce green of Hungarian yellow wax and Tabasco was found to be dominant to the sulphury white of Ornamental, and recessive to the cedar green of Oshkosh and Red Cherry. A single major factor pair differentiates the colors in both cases. Cedar green of Oshkosh and Red Cherry

was found to be dominant to sulphury white of Ornamental with 2 major factors differentiating the color. These results are in general agreement with earlier work which indicated that the immature fruit color is conditioned by several factors, (G_1g_1 , G_2g_2 — G_3g_3).—M. L. Odland.

12536. PETO, F. H. Hybridization of *Triticum* and *Agropyron*. V. Doubling the chromosome number in *T. vulgare* and F_1 of *T. vulgare* \times *A. glaucum* by temperature treatments. *Canadian Jour. Res. Sect. C, Bot. Sci.* 16(12): 516-529. 1 pl. 1938.—An apparatus was developed for applying heat treatments to spikes on plants growing in the field. This apparatus gave very satisfactory results on self-fertilized zygotes of Marquis wheat. Treatments at 42, 43, and 44° C for 20 min. induced chromosome doubling in 2% of the plants. A wide variety of temp. treatments was applied to more than 13,000 wheat florets 16-27 hr. after being pollinated with *A. glaucum*, in an attempt to produce fertile and stable F_1 hybrids. Chromosome doubling was induced in one F_1 plant of Kharkov \times *A. glaucum* by exposure to alternating temps. of 36° and 109° F. The resulting 84-chromosome plant grew slowly and failed to produce any spikes, as was the case with a number of 42-chromosome plants of this cross. Consequently there is uncertainty as to whether this plant is inherently abnormal aside from chromosome doubling, or whether the chromosome number is too high for normal development. Chromosome doubling by means of temp. treatments can apparently be induced only with great difficulty in *Triticum*-*A. glaucum* hybrids.—Auth. abst.

12537. RASMUSSEN, J. Notes on some mutants in *Pisum*. *Hereditas* 24(1/2): 231-257. Illus. 1938.

12538. THOMPSON, ROSS C., and WILLIAM F. KOSAR. Polyploidy in lettuce induced by colchicine. *Proc. Amer. Soc. Hort. Sci.* 36: 641-644. 1938(1939).—Lettuce seed of the var. Grand Rapids was placed in a small amount of 0.1% colchicine in petri dishes under conditions favorable for germination. At intervals of $\frac{1}{2}$, 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, 19, 21, 23, 27 and 48 hrs. portions of the seed were removed from the soln., planted in flats and covered with muck. Out of approx. 200 plants grown from this colchicine-treated seed 3 proved by breeding and cytological tests to be polyploids having 18 pairs of gametic chromosomes, while the haploid number for this variety is 9 pairs. The 3 tetraploids all came from the 27-hr. treatment. All 3 of these showed a high degree of self-sterility, as have later progenies from them.—R. C. Thompson.

12539. ZOISSIMOVITCH, V. I. Novye Gibrity Mejdu Dikoi i Sakharnoi Svekloi k. Tzerkospore. [New hybrids between wild and sugar beets, resistant to *Cercospora*.] *Selektzia i Semenovodstvo* [Plant Breeding and Seed Growing] 1. 1939.—The possibility of producing *Cercospora*-resistant vars. by hybridizing wild beets (*Beta maritima*) from Denmark, England, France and Belgium with sugar beets was demonstrated in USSR. Even the segregates in the F_1 may surpass the sugar beet in yield of sugar, and in resistance to *Cercospora*. The sugar content is only slightly lower than in the sugar beets, and high sugar production in the F_2 has been demonstrated. The weight, comparative sugar content, etc., of these strains are given. The wild Western European beets were selected by natural selection under conditions of long-standing iarovisation and sufficiently long day, and so there were no "bolters."—J. W. Pincus.

ANIMAL (EXCEPT MAN)

12540. BECKER, ERICH. Die Gen-Wirkstoff-Systeme der Augenausfärbung bei Insekten. *Naturwiss.* 26(27): 433-441. 2 fig. 1938.—Review and discussion of the results so far obtained in the expts. on eye pigmentation of *Drosophila*, *Ephestia* and *Habrobracon*.—S. Gluecksohn-Schoenheimer.

12541. BODENSTEIN, DIETRICH. Investigations on the problem of metamorphosis. V. Some factors determining the facet number in the *Drosophila* mutant Bar. *Genetics* 24(4): 494-508. 1 fig. 1939.—In transplanting young *Drosophila* eye discs into older larvae it was possible to reduce the number of facets in the transplanted eyes considerably. This is due to the fact that the young eye discs transplanted into older hosts are exposed to the pupation influences earlier and will hence differentiate sooner. Only eye discs older than 50 hrs. can react to the differentiation factors. The length of time "reacting" eye discs remain in the larvae determines the

final number of facets. By different starvation expts. the larval life could be prolonged or shortened; the onset of differentiation could thus be varied. Prolonged larval life will in general increase, and shortened larval life decrease, the number of facets. The rôle of certain developmental systems in changing the facet number is discussed.—*D. Bodenstern*.

12542. CHASE, HERMAN B. Studies on the tricolor pattern of the guinea pig. I. The relations between different areas of the coat in respect to the presence of color. *Genetics* 24(4): 610-621. 1939.—The genetics of the color-white pattern is reviewed. Composite patterns show symmetry and regularity for white spotting even though individual patterns are asymmetrical and unpredictable. In the main there is a regular sequence in the extent of color in such composite patterns from strains with little color to strains of self color. Hereditary factors determine the level of a strain with respect to the sequence. There are, however, minor differences in localization in the composite patterns that are hereditary. Correlation studies of 2 inbred strains indicate that the non-hereditary factors involved in white spotting act locally rather than on the animal as a whole. All correlations between remote regions are substantially zero in such inbred stocks.—*H. B. Chase*.

12543. CHASE, HERMAN B. Studies on the tricolor pattern of the guinea pig. II. The distribution of black and yellow as affected by white spotting and by imperfect dominance in the tortoise shell series of alleles. *Genetics* 24(4): 622-643. 1939.—The multiple allelic series for extension of black, E , e^p , e , is considered in respect to dominance. The tortoise shell factor, e^p , is statistically not completely dominant over e . Both $e^p e^p$ and $e^p e$ are highly variable and overlap widely. A method of using hair samples (750 hairs from each guinea pig) for recording the black-yellow pattern is described. By means of this method an analysis of the relation of tortoise shell and piebald is made. Segregated black and yellow tend to occur on the nose and feet and yellow in particular tends to occupy those localities most frequently white. With the introduction of white, black and yellow hairs tend to be segregated rather than mixed as a brindle and there is a relative increase in number of yellow hairs. The effects upon the black-yellow pattern vary apparently according to the amt. of white, not according to the constitution of the animal with respect to the major pair of alleles, S , s , alone. Questions are presented which must be solved in any final interpretation of pattern in relation to gene action. Evidence is considered from studies in various fields, embryology, transplantation, dopa reaction, and somatic mutation.—*H. B. Chase*.

12544. CLARK, FRANK H. Postjuvénal nude in the deer-mouse. *Jour. Heredity* 30(5): 213-215. 2 fig. 1939.—Postjuvénal nude, an hereditary hair deficiency in the deer-mouse, *Peromyscus maniculatus* affects only the postjuvénal pelage and is a simple Mendelian recessive character. It is caused by faulty keratinization of the hairs of the postjuvénal coat, causing them to break off at or beneath the surface of the skin. Nude differs both genetically and histologically from ordinary recessive hairlessness in the deer-mouse.—*F. H. Clark*.

12545. COLE, LEON J., and WILLARD F. HOLLANDER. The inheritance of silky plumage in the domestic pigeon. *Jour. Heredity* 30(5): 197-201. 3 fig. 1939.—Silkiness from Fantail pigeons, *Columba livia* var. *domestica* can be classified in 2 grades, moderate and extreme. Moderate silks bred inter se produced 80 silky and 24 normal young of both sexes. Reciprocal matings of moderate silks with normals gave a total of 146 silks (all moderate) and 159 normals. It is concluded that a simple dominant autosomal factor, L , is responsible for silkiness and that the extreme type is the homozygote. No evidence supporting the theory of sex-linkage of the trait was found. Tests with the autosomal color factor S and with pure white (recessive) plumage color indicate no linkage. In general structure the silky feather is nearly normal, but the barbules are poor in strength and elasticity and the barbs tend to twist. The nestling down tends to curl.—*Authors*.

12546. COOK, R. Wattled pigs in Panama. *Jour. Heredity* 30(5): 216-217. 1 fig. 1939.—Several photographs illustrate the striking variation as it appears in a herd of swine derived from one wattled ♀. After 10 years of free

inbreeding a majority of the pigs are wattled.—*L. M. Dickerson*.

12547. COOPER, CHARLES B. A linkage between naked and caracul in the house mouse. *Jour. Heredity* 30(5): 212. 1939.—In linkage expts. with 4 multiple stocks the mutation caracul (W_3), reported by F. G. Carnochan in 1937, was found to be linked with naked, with a cross-over value of 1.8%.—*L. M. Dickerson*.

12548. DUNN, L. C., and S. GLUECKSOHN-SCHOENHEIMER. The inheritance of taillessness (anury) in the house mouse. II. Taillessness in a second balanced lethal line. *Genetics* 24(4): 587-609. 1939.—Paper contains full data on breeding expts. with a line of tailless mice (cf. Dunn 1937 Proc. Nat. Acad. Sci. 23: 474-477). The line breeds true because heterozygous for 2 lethals which do not cross over and are probably alleles. The mutations involved are a dominant T (Brachy or short-tailed) which acts as a homozygous lethal at 11 days in utero; and a recessive t^1 (homozygous lethal before implantation). The tailless line is Tt^1 . Tailless ♀♀ crossed with normal ♂♂ show normal segregation of T and t^1 (65 normal t^1+ , 60 Brachy $T+$); tailless ♂♂ by normal ♀ always produces a large excess of normal offspring (647 normal t^1+ , 88 $T+$). Heterozygous ♀♀ t^1+ tested by ♂♂ $T+$ (short-tailed) show normal segregation (764 normal, 385 short-tailed, 411 tailless); heterozygous ♂♂ t^1+ tested by ♀♀ $T+$, always show excess of offspring which inherit t^1 (1820 normal $++$ and $+t^1$, 378 Brachy $T+$, 1336 tailless Tt^1). Two significant departures from normal segregation are found whenever t^1 is present in the ♂: (1) t^1 is transmitted to more than half the progeny; (2) progeny inheriting the allele of t^1 (either $+$ or T) tend to occur in clusters. These results are interpreted as due to an effect of t^1 on meiosis, the higher frequency of t^1 to extra divisions of cells containing it; clustering to association of spermatozoa containing the allele of t^1 . Similar effects of another allele at this locus, t^0 , are reported. The hypotheses have not been tested by cytological observations.—*L. C. Dunn*.

12549. FOHRMAN, M. H., and R. R. GRAVES. Experiments in breeding Holstein-Friesian cattle for milk- and butterfat-producing ability, and an analysis of the foundation cows and of the first outbred generation. *U. S. Dept. Agric. Tech. Bull.* 677. 1-81. 14 fig. 1939.—This is a report of the data compiled on the foundation herd of Holstein-Friesian cattle and the first generation sired by Denton Colantha Sir Rag Apple in the dairy cattle breeding expts. at Beltsville, Md. Milk and butterfat production, reproduction, and live-weight data on both groups are analyzed and compared. Persistency of milk flow, early weight as an indication of mature size, effect of age of parents on sex and producing ability of progeny, reliability of the intermediate bull index, the inheritance of tendencies toward difficult breeding and unbalanced sex ratios, and the transmitting ability of the above sire and his sons are all discussed in detail.—*M. H. Fohrman*.

12550. GOODRICH, H. B. Color changes in animals, their significance and activation. Chromatophores in relation to genetic and specific distinctions. *Amer. Nat.* 73(746): 198-207. 16 fig. 1939.—A limited comparative study of chromatophores of fish indicates that cell types of closely related spp. are more likely to be similar to each other than are those of more widely separated spp. Certain cell types follow the mendelian distr. of genes. The limits of distr. of a cell type may be less or even greater than the sp. Pigments such as melanins or carotenoids probably vary least; cell types are more numerous and macroscopic color patterns show the greatest diversity. The forms studied and reviewed are in part tropical fresh-water aquarium fish and in part marine fish which were studied at the New York Aquarium.—*H. B. Goodrich*.

12551. KING, HELEN DEAN, and LEON F. WHITNEY. A second independent occurrence of the curly, mutation in the rat. *Jour. Heredity* 30(5): 211-212. 1939.—Two genetically different types of dominant curly hair mutations in the Norway rat were reported some years ago. The 1st type (Cu) appeared in a colony of wild gray rats, the 2d type (Cu_2) in a strain of black hooded rats. In 1935 the junior author discovered a dominant mutation in a stock of albino rats. Results of genetic tests between these albino mutants and both Cu and Cu_2 mutants proved that this new muta-

tion is identical with *Cu₂*. This appearance of the same unusual type of mutation in 2 unrelated laboratory strains of the same species is rare in mammals.—*Authors.*

12552. LÖWE, H. Abhängigkeit und Vererbung der Fruchtbarkeit bei den grossen landwirtschaftlichen Haustieren unter besonderer Berücksichtigung des Rindes. *Kühn Archiv* 51(2): 71-267. 1938.—Fertility in domestic animals is reviewed from the standpoint of such factors as climate, condition, heredity, reproductive organs, ♀ hormones, artificial insemination and genetic relationships. Inheritance of fertility is reviewed for hogs, sheep and horses. Fertility among several family lines of cattle was studied from data from the Saxony herdbook. Two lines were studied involving 2,872 cattle with 12,598 calvings. Three values were calculated for each cow, namely, time in months from birth to initial breeding, number of calvings, and the average time elapsing between calvings. The data are analyzed statistically and family lines showing marked influence on productivity noted. Over 400 references are cited.—*C. W. Ackerson.*

12553. LUSH, JAY L. and A. L. ANDERSON. A genetic history of Poland-China swine. II. "Founders of the Breed," prominent individuals, length of generation. *Jour. Heredity* 30(5): 219-224. 1939.—Part II constitutes an analysis of the influence on the breed of outstanding individuals. The average rate of inbreeding from 1886 to 1929 was enough to lose about 6% of the existing heterozygosity per generation. There was only a faint tendency for distinct families to be formed. Three ancestors each contributed more than 12% of the genes of the breed, unless selection against those genes had been extreme and effective. One of these was an ancestor of the other two. The principal plan of breeding seems to have been selection and extensive use of the sons and daughters and grandsons and granddaughters of the currently most famous sires and dams in the breed. The average interval from one generation to the next is about 2½ years.—*Authors.*

12554. MATHER, K. Crossing over and heterochromatin in the X chromosome of *Drosophila melanogaster*. *Genetics* 24(3): 413-435. 1939.—Crossing over in ♀♀ homozygous for various X-chromosome inversions was compared with that in ♀♀ homozygous for the normal sequence. The inversions studied were *In y⁴*, *In sc⁴*, *In sc⁵*, and *In rst²*. Expts. were carried out at 19°, 25°, 28° and 30° C. The results indicate that (1) crossing over in the euchromatin is dependent upon the distance from the centromere, (2) heterochromatin shows crossing over, the frequency depending on distance from the centromere, and (3) high sensitivity of crossing over to temp. is a property of the heterochromatin. Of the 2 properties of centric regions in crossing over, low frequency is a property dependent on adjacency to the centromere and variability in the frequency is a property limited to heterochromatin.—*G. W. Beadle.*

12555. MOSSIGE, J. C. A closely linked group of dominant mutations in the third chromosome of *Drosophila melanogaster*. *Hereditas* 24(1/2): 110-116. 1938.

12556. PLUM, M. Inheritance of mammae in swine, a character involving partly symmetrical organs. *Hereditas* 24(1/2): 216-230. 1938.

12557. SMITH, SEDGWICK E., and RALPH BOGART. The genetics and physiology of lethal anemia in the rat. *Genetics* 24(4): 474-493. 14 fig. 1939.—A complete lethal anemia of rats (*Rattus norvegicus*) is described which acts as a simple autosomal recessive. The affected young have a deficiency of Hb, erythrocytes, reticulocytes and liver glycogen. Blood smears show a marked anisocytosis due to microcytes, polychromasia and Howell-Jolly bodies. The leucocytes are increased. There is a lack of erythrocytic centers in the bone marrow, a bilirubinemia, a fatty infiltration of the liver and a hemosiderosis of the liver and spleen. The anemia appears to result from an inability of the bone marrow to assume fully its homopoietic function at the time of birth. Accompanying this dyshemopoiesis may be some hemolysis of defectively formed red cells.—*S. E. Smith.*

MAN

12558. ALLAN, WILLIAM. Inheritance of short finger tendons. *Jour. Heredity* 30(5): 218. 1939.—Finger tendons too short to permit complete flexion or extension of some of the joints frequently are inherited. Four pedigrees illustrating this hereditary anomaly, with a brief description of the joint disabilities, are reported.—*W. Allan.*

12559. HEGDEKATTI, R. M. Congenital malformation of hands and feet in man. *Jour. Heredity* 30(5): 191-196. 3 fig. 1939.—The trait studied is considered to have come into existence by mutation. It is a 1-factor mutation and affects only the hands and feet. In inheritance it behaves as a simple Mendelian dominant and appears to be autosomal. There is variation in the degree of malformation; the offspring exhibiting any degree, regardless of that manifest by the parent. Data are from a family history of 6 generations.—*R. M. Hegdekatti.*

12560. JOOST, C. R. N. F. van. Drie gevallen van aangeboren longafwijkingen bij kinderen. [Three cases of inherited bronchiectasis in children.] *Geneesk. Tijdschr. Nederland-Indië* 79(19): 1155-1164. 1939.—Description of 3 children with bronchiectasis, i.e., lung cysts combined with congenital malformations in the lungs and elsewhere in the body, viz. in Case I with situs viscerum inversus totalis, agenesis of frontal sinus and accessory inferior lobe; in Case II with cryptorchism; and in Case III with azygos lobe of lung. There is no absolute evidence in favor of the congenital origin of these cysts. However, the early age of the children (5½-9 years) and the simultaneous occurrence with other congenital malformations are a strong support of the congenital nature of the cysts.—*W. Rudolfs.*

12561. WEPMAN, JOSEPH M. Familial incidence of stammering. *Jour. Heredity* 30(5): 207-210. 1939.—The backgrounds of 250 stammerers and a like number of non-stammerers as controls were examined and facts elicited as to the presence of stammering in the family tree. Wherever stammering was present that might be imitated or whenever the individual was hesitant or not sure the records were not accepted. The findings were: (1) that stammering does tend to appear more frequently in families where there has been stammering than in families where there has not been (ratio 6.12:1). (2) That stammering appears more frequently in the ♂ than in the ♀ (ratio 4:1).—*J. M. Wepman.*

BIOMETRY

JOHN W. GOWEN, *Editor*

(See also in this issue Entries 12473, 13654)

12562. LeCLERG, E. L. Relative efficiency of quasi-factorial and randomized-block designs of experiments concerned with damping-off of sugar beets. *Phytopath.* 29(7): 637-641. 1939.—Relative efficiency of quasi-factorial as compared with randomized-block design was determined for seedling stands of sugar beets, in the field and in the greenhouse. In the field, with 36 treatments, the former was the more efficient; with 25 or fewer treatments, the quasi-factorial design was less efficient in most comparisons. In greenhouse expts., made on 2 types of plant beds, marked losses in efficiency resulted with the quasi-factorial design as compared with a randomized-block arrangement.—*E. L. LeClerg.*

12563. MARBE, KARL. Das Ausgleichsprinzip in der Statistik und verwandte Probleme. 164p. C. H. Beck'sche Verlagsbuchhandlung: München, 1938. Pr. 6M.—This paper deals with the philosophy of and observational data behind our empirical statistical knowledge as exemplified in such material as throws of coins or sexes of births. The consistency of these results is the resultant of 2 factors, a so-called constant condition and a variable condition acting on it. Two equal-sized statistics will show the same relative frequency if the constant condition were the same, and if the variable condition should be fully balanced. This seldom happens. An adjustment principle is invoked to explain this unbalance. The book is devoted to the discussion of the basic elements of this principle.—*J. W. Gowen.*

German and French commercial makes are shown, but there is little information or reference to British or American models. There are no references to literature. Although no such thoroughness is attained as found in Kleinschmidt's "Handbuch" or Glazebrook's "Dictionary of Applied Physics," a wide range of instruments is included: solar radiation, atmospheric dust, visibility, pressure, temperature, evaporation, humidity, wind, cooling power, clouds, precipitation, snow, polarization, atmospheric electricity, pilot balloons and theodolites, meteorographs, radio-sondes, and installation of observatories, etc. Special research techniques are largely omitted. The format is good and the photographs usually clear, making an attractive and impressive volume.—*R. G. Stone (courtesy Bull. Amer. Meteorol. Soc.)*.

12568. HERZOG, FRANZ. *Formgestalt und Wärmehaushalt bei Sukkulenten. Jahrb. wiss. Bot.* 87(2/3): 211-243. 1938.—The temp. distr. in a body receiving radiation on one side (of plates or cylinder form) is considered theoretically and then tested by thermo-electric measurements on paraffin wax models and on cacti. An appendix by R. REBSCH develops the theoretical distribution of the temps. in a paraffin plate. In radiation expts. under controlled conditions the action of ribs, warty projections, thorns and hair coverings on the heating of succulents is investigated. The action of these form factors in plants is extraordinarily modified by their influence on reflection and on the reduction of gas exchanges. None of these form features appear to have significance as facilitating heat economy except, perhaps, the splitting of the surface into a few wing-like ribs. Further the burying of *Mesembryanthemum* in the soil has no advantage from this standpoint. Of quite outstanding significance to the degree of heating of the plant body is the air movement, which even at low velocities entirely removes the danger of overheating and which is to be regarded as the most significant ecological factor of the habitat. Expts. in the natural habitats in full summer confirm these laboratory expts. upon a series of types of succulents.—*J. H. Priestley*.

12569. HINCHY, V. M. The relation between frond transpiration and yield of sap in the nipah palm (*Nipah fruticans*). *Malayan Agric. Jour.* 26(10): 420-425. 1938.—The daily variation in yield of sap from tapped spathes was inverse to the relative humidity. Installation of atmometers on a level of the tops of the palms enabled the plantation management to forecast very closely the yield of sap for the day, when read at 7 A.M. A nipah plantation should not be exposed to brilliant sunshine and high winds. Shade trees and wind breaks should be provided, not so dense as to exclude light but sufficient to disseminate the rays of the midday sun, and for this purpose interplanting of coconuts is recommended.—*W. D. Pierce*.

12570. HUMMEL, K. Über die Temperaturen in der Sojablüte. *Bioklimatische Beiblätter* 6(1): 13-17. 3 fig. 1939.—The development of fruits in artificially pollinated soybean plants is exceptionally dependent upon climatic factors. Under natural conditions the temp. inside a normal, exposed flower may exceed the air temp. by as much as 6°C on bright days. Inside the dry bag covering the artificially pollinated bloom, however, the temp. level in the day-time is about 3°C above that of a flower not enclosed in a bag. A moist paper bag keeps the temp. approx. on the same level as in the natural flower.—*H. Landsberg*.

12571. WILSON, L. R. A temperature study of a Wisconsin peat bog. *Ecology* 20(3): 432-433. 1939.—Temps. taken vertically through a peat deposit decreased from the surface to near the bottom, where a slight rise was noted. It is suggested that the lowest peat is heated from the sand below, and the sand is a conductor of heat from the periphery of the deposit.—*L. R. Wilson*.

ANIMAL

12572. BAWEJA, K. D. Studies of the soil fauna, with special reference to the recolonization of sterilized soil. *Jour. Animal Ecol.* 8(1): 120-161. 1939.—Four plots (9×9 ft.) at Rothamsted Exptl. Station, England, were sterilized by baking to a depth of 1 ft. in Feb. and 4 more in May, 1936. Two plots in each set were enclosed on the 4 sides by iron sheets 12 in. below and 6 in. above ground; the others were left unenclosed. Control plots were provided for com-

parison. Lawn grass was later sown in all plots. After sterilization, fortnightly samples of the soil were taken through 14 months to study recolonization. The prominent animals that occurred were (of insects) Collembola, Diptera, Coleoptera, Hemiptera, and Hymenoptera, and (of other invertebrates) Myriopoda, Arachnida, and Oligochaeta. In the control plots the mean normal population varied from 61.2 to 67.6 million, and in the sterilized plots from 98.3 to 111.8 million per acre. An analysis is given of the individual orders and immature forms. 7 and 5 months respectively were required for the soil population to reach a normal density in the sterilized unenclosed and enclosed plots, by which time their populations were 1.5 to 1.8 times the controls. The proportion of insects to other invertebrates was raised from 2:1 in the controls to 20:1 in certain of the sterilized plots, a striking instance being that of Aphididae, which increased 43.6 times the controls. The peak seasonal density of population was reached in late Autumn and was caused especially by a sudden increase and later decrease of Collembola. Decreasing temps. between 55° and 45° F seem optimum for this latter group. Economic aspects of sterilized soils in greenhouses and baked soils in tropics are discussed. A few organisms were found in soil to a depth of 33 in. but 80 to 91% occurred in the top 9 in., being higher in spring than in winter in the top layers but the reverse in the deeper subsoil.—*S. C. Kendeigh*.

12573. HAWES, R. S. The flood factor in the ecology of caves. *Jour. Animal Ecol.* 8(1): 1-5. 1939.—Summer drought and winter flood introduce a variable into an otherwise constant cave environment. This alternation imposes recurrent quiescent and active phases on such cave inhabitants as serpulid polychaete worms, plumatellids, and sponges. Flooding introduces food into the caves while regression of flood waters may isolate small groups of organisms into small pools for months at a time. Dispersal of animals from one cave to another may be brought about by flooding, and an illustration is given with a small cyprinid fish, how flooding may aid in the colonization of caves with fauna from the outside.—*S. C. Kendeigh*.

12574. KUGLER, HANS. Blütenökologische Untersuchungen mit Hummeln. IX. *Planta* 29(1): 47-66. 1938.—In previous expts. it was found that diversity of shape and color and depth of the object enhance the attractiveness of models for bumble bees. In the present study it is shown that these characters if they pertain to true flowers have the same effect. Thus *Cichorium intybus* is more attractive than *Geranium pratense*. Flowers with 2 or more distinct colors are more attractive than those with only one. Funnel shaped flowers as those of *Gentiana* or headed flowers such as *Aconitum* have especially attractive shapes. The flower heads of *Trifolium knautia* and *Cirsium* are relatively unattractive. This is, however, only true of the close-up optical effect of the latter flowers, and this is amply overbalanced by their high nectar content. Thus diversity of shape and color have appreciable selective value where bumble bees act as pollinators and where these are not overly abundant.—*B. R. Nebel*.

12575. LESLIE, P. H., and D. H. S. DAVIS. An attempt to determine the absolute number of rats on a given area. *Jour. Animal Ecol.* 8(1): 94-113. 1939.—An area of town is trapped over a series of nights in a systematic manner for *Rattus rattus* and the results subjected to a theoretical statistical analysis in an attempt to calculate the probable total population. A theory of trapping is suggested which is an adaptation of the elementary kinetic theory of gases.—*S. C. Kendeigh*.

12576. McDONOGH, RICHARD S. The habitat, distribution and dispersal of the psychid moth, *Luffia ferchaultella*, in England and Wales. *Jour. Animal Ecol.* 8(1): 10-28. 1939.—This small wingless moth lives on tree trunks and depends for food and a protective case upon lichens, chiefly *Lecanora*. The moth is more abundant on trees with creviced bark, of a circumference greater than 6-8 in., growing in semi-open situations, and with algal-lichen flora. The moth larvae avoid areas on the tree with a light intensity less than 0.025 of that in the open. The distribution in England was mapped. The moth was not found on hills above 400 ft. nor in areas where the July temp. (the month when the adults emerge and lay eggs) averaged below 62° F,

although this was partly compensated for in regions with over 210 hrs. sunshine in July. Dispersal of the moth from tree to tree is largely by wind, and mass migration of the larvae may occur from one part of the tree to another. The larvae become inactive below 40° F, avoid low humidities, are positively phototropic, are more positive to red light, and in the laboratory, but perhaps not in nature, are negatively geotropic.—S. C. Kendeigh.

12577. MOORE, HILARY B. The colonization of a new rocky shore at Plymouth. *Jour. Animal Ecol.* 8(1): 29-38. 1939.—A newly formed beach of limestone and concrete was watched for 2 years for progress of colonization, which was chiefly by Annelida, Crustacea, and Mollusca. An established mature beach nearby was studied for comparison. In the new beach it was evident that competition for foothold was not keen but rather that colonization was a very gradual process with only some half-dozen spp. capable of finding conditions suitable from the first and that other spp. must wait for improvement in the habitat. There was some evidence that the unfavorable conditions affected the survival of the young more strongly than the adults, for once established, growth rate was normal.—S. C. Kendeigh.

12578. SMITH, E. P. On the introduction and distribution of *Rana esculenta* in East Kent. *Jour. Animal Ecol.* 8(1): 168-170. 1939.—An account is given of an introduction of 12 specimens in the winter of 1934-1935, their spread over an area 28 miles in diam., their loud and annoying songs, and 3 years later, the abatement of their vociferous singing, implying a decrease in abundance. They are very migratory, are powerful swimmers and jumpers, mature in 12 months but require 4 or 5 years to reach full size, are shy but curious in disposition, have ventrioloquistic power with their voices, and mate in May and June.—S. C. Kendeigh.

12579. STAMMER, H. J. Ziele und Aufgaben tiergeographisch-ökologischer Untersuchungen in Deutschland. *Zool. Anz. Suppl. (Verhandl. deutsch. zool. Ges.* 11: 91-119. 1938.—A lecture urging as topics for more intensive study: taxonomy of the German fauna, food habits, characteristics of land biotopes, make-up of biocoenoses, application of the methods of hydrobiology to land habitats and communities, determination of climatic factors, relations of herbivorous animals to plants, predators to prey, population studies, and other biocoenotic equilibria.—L. H. Hyman.

12580. TISCHLER, W. Zur Ökologie der wichtigsten in Deutschland an Getreide schädlichen Pentatomiden. II. *Zeitschr. Morph. u. Ökol. Tiere* 35(2): 251-287. 19 fig. 1939.—The chief grain-feeding pentatomids of E. Prussia are: *Eurygaster testudinaria*, *Aelia acuminata*, *Palomena prasina*, *Dolycoris baccarum*, *Carpocoris pudicus*, *Pentatoma rufipes*, and *Eurydema oleraceum*. Other spp. of these genera also occur. The area studied belongs chiefly to the Baltic region, with much snow (60 days), late spring, and short vegetation period (150 days). The stink bugs hibernate along forest margins and in open woods, in company with a large assemblage of other insects, of which a list is given. The summer biotope of the bugs is the dry, non-cultivable steppe-heath formation with many spp. of flowering plants; secondarily the bugs invade cultivated areas, when these are adjacent to their natural biotope. Rye is most subject to attack but when the rye is ripe the bugs may move to oat fields, and after the harvest they return to the waste lands. The bugs emerge from hibernation at the end of April, depending on ground temp., mate at once, and lay eggs at the end of May. In *Dolycoris* and *Carpocoris* there is a marked predominance of ♂♂. The larvae hatch in June. Dependence of rate of embryonic and larval stages on temp. is shown in a series of graphs but the later instars of *Palomena* are eurythermal. Humidity has little effect on development but is decisive in hibernation, as mortality is greater the lower the humidity of the winter quarters. Temp. and humidity control the mortality of these bugs; the optimum conditions for the larvae are temps. of 24-30° and 80-100% relative humidity. High temps. can be endured only when the humidity is high. Developing eggs are less sensitive than the larval stages. Carnivorous insects hibernating with the bugs eat considerable numbers of them, both in the winter quarters and along forest margins after emergence. The bugs are parasitized by tachinid flies, especially *Gymnosoma rotundatum*, and by the hymenopteron *Telenomus*

semistriatus. Lists are given of the food plants and breeding plants of *Dolycoris* and *Carpocoris*.—L. H. Hyman.

12581. TRAHMS, OTTO-KARL. Die Grössen- und Kalkreduktion bei *Mytilus edulis* L. in Rügenschon Binnengewässern. *Zeitschr. Morph. u. Ökol. Tiere* 35(2): 246-250. 1 fig. 1939.—In the group of brackish bays of the Rügen region (Pomerania), the size of bivalves varies directly with the salt content of the water. *Mytilus* is very scarce and very small (10-16 mm. long) in the Grossen Jasmunder Bodden with 6.5‰ salt content. However, this mussel is considerably larger in other localities of the same content, so that its great reduction here seems to depend on poor nutrition. The lime content of the reduced shell is 57%, organic content 43% as compared to 82% lime, 18% organic content in *Mytilus* from outside waters.—L. H. Hyman.

PLANT

12582. BEHR-NEGENDANK, CECILIE GRÄFIN. Saugkraftmessungen an Halophyten-Standorten der Nordseeküste. *Biol. Zentralbl.* 59(5/6): 235-273. 15 fig. 1939.—The soil at the marshy margins of the North Sea coast at Spiekeroog is separated into 2 zones by the mean high water line, below which the suction force is that of the seawater, 0.4-0.5 M NaCl, while above the line the value decreases to <0.1 M. In general the soil with the higher water content has also the higher suction force. An outline map and profile figures of the soil showing the suction force at the surface, at 3-5 cm and at 15 cm depth show the variations at a glance. Very high values (>5.3 M => 300 atm.) at the surface of the terrace were found. Here the greatest difference between morning and evening values amounted to 25 atm. At 3-5 cm. the daily fluctuations were slight. A comparison of the sandy soil at Spiekeroog with a muddy soil at Neuharling Island showed that 2 soils of different structure and water content may have very similar suction force because of the same concn. of the soil solns. The distribution of *Salsicornia*, *Triticum* and *Atropis* was studied in relation to the suction force at Borkum. *Salsicornia* did not thrive well where the value was 1.3 M, but could nevertheless still maintain itself where the suction force was 1.8 M. The salt conc. is the decisive factor in determining the suction force of the coast soils. At some places the plant suction force had always a higher value than the suction force of the soil, but, on a hot summer afternoon, the suction force of the soil could be greater than the suction in the plant roots.—A. H. Hersh.

12583. CANFIELD, R. H. The effect of intensity and frequency of clipping on density and yield of black grama and tobosa grass. *U. S. Dept. Agric. Tech. Bull.* 681. 1-32. 8 fig. 1939.—On the Jornada Exptl. Range in southern New Mexico, black grama (*Bouteloua eriopoda*) was clipped at heights of 1 and 2 inches at intervals of 2, 4, and 6 weeks during the summer growing season and at the end of the season with one-meter-square quadrat for each treatment. During 10 yrs. for the 1-inch series and 11 years for the 2-inch series all treatments were so severe as to bring about the following conditions: (1) vegetative reproduction was prevented after the 2d year; (2) annual volume of forage was drastically curtailed; (3) density of plant cover was reduced practically to zero in the latter years of the expt. Tobosa grass (*Hilaria mutica*), under a similar design, was clipped for 11 yrs. at heights of 2 and 4 inches above the ground, at 1-, 2-, and 4-week intervals throughout the growing period, and at the end of the season. Clipping at 2 inches resulted in decreased density on the quadrats clipped at 1-week and 2-week intervals. Monthly clipping and the end of the growing season clippings permitted an increase in density but the physical condition of the plants was impaired and the forage yield reduced. Clipping at 4 inches produced no observable ill effects. Density increased under the clipping treatment as follows: 1 week—197%, 2 weeks—123%, 4 weeks—51%. The plot clipped weekly was outstanding in production with 9.62 g. mean annual air dry yield; while the 2- and 4-week clippings produced 5.33 g. and 6.22 g. respectively.—R. H. Canfield.

12584. EVENARI, MICHAEL (WALTER SCHWARZ). The physiological anatomy of the transpiratory organs and the conducting systems of certain plants typical of the

wilderness of Judaea. *Jour. Linn. Soc. [London] Bot.* 51(340): 339-407. 16 fig. 1938.—The plants investigated can be arranged in the following groups according to their anatomical structure: (1) Extreme xeromorphic: *Retama retam*. (2) Herbaceous with a few xeromorphic characteristics: *Heliotropium rotundifolium*, *Haplophyllum tuberculatum*. (3) Non-herbaceous xeromorphic with succulent characteristics: *Anabasis articulata*, *Salsola rigida*. (4) Herbaceous with a few succulent and xeromorphic characteristics: *Atriplex halimus*. (5) Herbaceous without xeromorphic characteristics: *Erodium glaucophyllum*, *Reseda muricata*. (6) Full succulents: *Suaeda asphaltica*. (7) Succulents with xeric characteristics: *Zygophyllum dumosum*. Comparing the number of stomata of these desert plants with those of plants from other habitats, the non-succulent desert xerophytes show the highest stomatal numbers, the desert succulents the lowest values. The transpiration per unit number of stomata is greater in the xeromorphic xerophytes with their so-called "protective" adaptations than in the xerophytes which lack such features. But these structures are not without effect. Such plants possess the property of being able to cut down their transpiration very suddenly. The full succulents show low transpiration values, but lack the power of adapting themselves to a poor water supply from the soil. The ratios surface of water-conducting elements/fresh weight of organ and surface of water-conducting elements/surface of organ are roughly proportional to the intensity of transpiration. The other dimensions of the water-conducting system show no relationship to the transpiration intensity.—*M. Evenari*.

12585. FIRBAS, F. Vegetationsentwicklung und Klimawandel in der mitteleuropäischen Spät- und Nachzeit. *Naturwissensch.* 27(6): 81-89. Illus. (incl. maps). 1939.

12586. FRASER, LILLIAN, and JOYCE W. VICKERY. The ecology of the Upper Williams River and Barrington Tops Districts. III. The Eucalypt forests and general discussion. *Proc. Linn. Soc. N. S. Wales* 64(1/2): 1-33. 3 pl. 1939.—The Eucalypt-forest formation occurs on upper slopes and ridges in the Williams River valley, and on the Barrington Tops plateau. It consists of a tree stratum, composed of various species of *Eucalyptus*, which forms a more or less continuous but relatively thin canopy, a discontinuous small-tree stratum, a tall-shrub stratum 6-8 feet high, a low-shrub stratum and a ground stratum. A considerable amount of light reaches the lower strata in this formation. The height of the trees varies from more than 150 feet in sheltered places, such as on the valley floor, to less than 40 ft. on exposed parts of the plateau. Five associations, more or less limited by altitude, are recognized within this formation, each characterized by different species of *Eucalyptus*. The floras of the swamps and creeks at the head of the Barrington River are described, and the distribution of the sub-alpine and montane spp. discussed. Lists of spp. occurring in the various associations are given, and the life-form spectra of the Eucalypt forests, and of the sub-tropical and sub-antarctic rain-forests are considered. The floristic and ecological relationships of the various formations occurring within the area studied are discussed.—*Authors*.

12587. GRANT, CHARLOTTE L. Plant structure as influenced by soil moisture. *Proc. Indiana Acad. Sci.* 48: 67-70. 1938(1939).—*Zinnia*, *Phaseolus*, *Impatiens*, and *Ricinus* were grown in 3 limited and non-overlapping ranges of soil moisture—wet, moist, and dry. This method of moisture control recognizes need for adequate pre-study of moisture properties of soils used. Moisture capacity of a soil column, of the height used in cultures, field capacity, and wilting percentage are the essential properties for establishing the moisture ranges. Intervals between ranges are equal. Growth responses and anatomical data show that there are different moisture optima for growth of particular plants. Moreover, since wet, moist, and dry ranges in soils of different texture were made equivalent, a real study of soil-texture influence was made possible.—*C. Grant*.

12588. HALL, THOMAS F., and WILLIAM T. PENFOUND. A phytosociological study of a cypress-gum swamp in southeastern Louisiana. *Amer. Midland Nat.* 21(2): 373-395. 5 fig. 1939.—A young cypress-gum swamp near Shidell, Louisiana included the swamp black gum, *Nyssa*

biflora, as the important species with bald cypress, *Taxodium distichum*, and tupelo gum, *Nyssa aquatica*, as minor codominants. Although the trees were young and of small diam. (5.4-6.7 inches) the forest exhibited a basal area of 203 sq. feet per acre. Peculiarities of this swamp are the development of black gum stools, the absence of definite frutescent and herbaceous strata and the presence of relict patches of marsh. Only 8 of the 22 spp. of trees, shrubs, and vines are recognized as true swamp spp. and only 5 herbs were found within the confines of the swamp. Although the mermaid weed, *Proserpinaca palustris*, was the sp. of highest frequency (81%), it exhibited a low cover-grade (6-25%). The small number of herbaceous spp. is due mainly to the low light intensity and long hydroperiod that obtains in this swamp.—*W. T. Penfound*.

12589. HANSEN, HENRY P. Postglacial vegetation of the Driftless Area of Wisconsin. *Amer. Midland Nat.* 21(3): 752-762. 5 fig. 1939.—Pollen analysis of 3 postglacial Third-Wisconsin bogs within the Driftless Area of Wisconsin, shows the postglacial forest succession which has occurred in this area. Interpretation of the pollen record indicates the forest succession was apparently as follows: An initial stage of *Abies-Picea-Pinus*, succeeded by a *Pinus*-Deciduous stage, with a final stage of Deciduous-*Pinus* with the advent of some prairie in recent times. In terms of climate this indicates an initial cool period, followed by a warmer period which has probably remained more or less uniform to the present. In the upper third of the spectrum the presence of grass may reflect a period of slight desiccation.—*H. P. Hansen*.

12590. HANSON, HERBERT C. Fire in land use and management. *Amer. Midland Nat.* 21(2): 415-434. 1939.—Fire has been used as a tool in the following land management practises: (1) Destruction of debris, as straw and other crop residues, logging slash, etc., to reduce fire hazard and to facilitate cropping or plant succession; (2) destruction of pests such as weeds, insects and diseases; (3) clearing land for cultivation or to improve conditions for desired plants by burning trees and shrubs, weeds as Russian thistles, draining and burning bogs, and as a substitute for tillage in crop rotation; (4) improving grazing conditions by destroying brush and trees, coarse grasses, dead vegetation, and to stimulate early spring growth; and (5) improving recreational areas. In many of these practises fire has proven distinctly serviceable, in some cases it has caused irreparable damage, and in other cases it is doubtful whether the advantages were greater than the disadvantages or not. It is the duty of research to determine fully and accurately the values and losses caused by fire not only to present existing vegetation, animal life, soils, etc., but also to the future conditions of the burned area. New uses or new disposal methods of residues and debris may be found. This duty can only be accomplished by painstaking measurements and observations involving various fields of science and lasting over a period of many years. At present the supply of scientific data of this sort is very meager. As such data accumulate, fire as a tool in land use and management will be utilized far more efficiently by administrators than is possible at present.—*H. C. Hanson*.

12591. IVES, RONALD L. Infra-red photography as an aid in ecological surveys. *Ecology* 20(3): 433-439. 3 fig. 1939.—Differences in the infra-red reflecting power of different plant types, as determined from infra-red photographs, may be used to expedite ecological field work. Standard photographic equipment, carefully used, is adequate in most instances. The useful range of the camera using infra-red sensitive materials is seldom over 10 miles in ecological work, the accuracy of determinations declining rapidly with distance because of contrast degradation caused by scattered light in the atmosphere, and by other factors. Differences in stages of growth or states of nutrition of the plants in a single group may sometimes be determined from infra-red photographs. In any environment, careful checking of field data and photographic evidence is desirable. Serious errors of classification will occur when differences of environment, such as altitude, are not taken into consideration.—*R. L. Ives*.

12592. MCCOY, SCOTT. A photosociological study of the woody plants constituting twenty-five type forests

on the Illinoian till plain in Indiana. *Proc. Indiana Acad. Sci.* 48: 50-66. 4 fig. 1938(1939).—Twenty-five type forests were selected on the glacial till plain, 16 on the eastern lobe and 9 on the western lobe. Habitat sites were very similar in respect to soil texture, temp., and precipitation but differed in drainage. Ten-meter quadrats, 20 in each forest, were laid out; all the woody stems above 3 feet high were counted, and their D.B.H. measured. The size class, frequency, and density of each sp. were tabulated. Dominant spp. in the water-logged sites were *Quercus palustris*, *Liquidambar styraciflua*, *Acer rubrum*, *Nyssa sylvatica*, *Ulmus racemosa* and *Fagus grandifolia* invaded the higher hummocks in wet sites and continued dominant into mesophytic beech-maple sites. Dominants on the mesophytic sites were *A. saccharum*, *Liriodendron tulipifera*, *Carya glabra*, *Q. borealis* and *Fagus grandifolia*. With continued dissection of site, mixed hardwoods gave way to oak-hickory. Forests on the western lobe, differing markedly from those on the eastern lobe, were predominately of the oak-hickory type. Less soil water, due to possible greater evaporation stresses and better subsoil drainage, may account for low frequency and fidelity of *Fagus*, *Liquidambar* and *Acer saccharum* in the forests on the western lobe with resultant oak-hickory control.—S. McCoy.

12593. MULLER, CORNELIUS H. Relations of the vegetation and climatic types in Nuevo Leon, Mexico. *Amer. Midland Nat.* 21(3): 687-729. 7 pl. 1939.—Classifications of climatic types in Nuevo Leon are exceedingly inaccurate because of the scarcity of observatories in the mountains. Existing vegetation types at high elevations indicate several cooler and more moist climatic types than those credited to the lowland observatories. Vegetation types and corresponding climatic types are described under the following designations: 1) central plateau desert scrub with warm and arid climate, 2) eastern coastal plain scrub with warm and semi-arid climate, 3) piedmont scrub and montane low forest with mild and semi-arid climate, 4) montane mesic forest with cool and subhumid climate, 5) western montane chaparral with cool and semi-arid climate, 6) subalpine humid forest with cold and humid climate, and 7) alpine meadow and timberline with alpine climate. Mean annual temps. range from 25° C on the plains to 3° C in the alpine zone; rainfall from 360 mm. to about 2,250 mm. The vegetation types range from the most scant of desert scrub to luxuriant forests and lush meadows. The altitudes range from about 300 m. to 3,800 m., the mountains occupying over one-fourth the area of the State. Landscape photographs illustrate the vegetation types; maps include relief and distribution of vegetation and climatic types.—C. H. Muller.

12594. OOSTING, HENRY J., and LEWIS E. ANDERSON. Plant succession on granite rock in eastern North Carolina. *Bot. Gaz.* 100(4): 750-768. 9 fig. 1939.—Granitic rock outcrops are frequent in the vicinity of the fall-line in N. Carolina, S. Carolina and Georgia. The unfavorable conditions for plant development on rock are here accentuated by long dry summers and high temps. Succession on the N. Carolina rocks follows 2 major lines originating (1) on the rock surface and (2) in depressions. *Grimmia* is the important mat-forming pioneer followed by (1) *Cladonia-Selaginella*, (2) *Polytrichum*, (3) *Andropogon*, and (4) Conifers. The depressions have a variable development terminating in hardwoods. Considering the rate of succession it is suggested that vegetation once completely covered the rocks but that the activities of man resulting in frequent fires and erosion bared the surfaces which are today maintained by drought, windthrow and fire.—Authors.

12595. PENFOUND, W. T., and T. F. HALL. A phytosociological analysis of a tupelo gum forest near Huntsville, Alabama. *Ecology* 20(3): 358-364. 3 fig. 1939.—A tupelo gum swamp near Huntsville, Alabama, is characterized by a dense arborescent stratum, but no frutescent or herbaceous layers. The slender trees are nearly 200 yrs. old, 104 feet in height, 9 inches in diameter at the height of one's head but with swollen bases 16.5 inches through. The north faces of the trees are clothed with a mantle of liverworts and mosses but the south exposures are devoid of bryophytes. Only 12 arborescent spp. and 7 herbaceous spp.

were found in this swamp presumably due to the combination of dense shade and long hydroperiod.—W. T. Penfound.

12596. SCHAEDE, REINHOLD. Die Actinomyceten-symbiose von *Myrica gale*. *Planta* 29(1): 32-46. 1938.—The walls of the older cells carrying infection become lignified, as do the membranes of the fungus where it penetrates the cell walls. The plasma of the fungus becomes digested which may not affect the membranes. In certain nodules the digestion is not complete. One can distinguish 2 groups of nodules: in one the host has the complete supremacy at the expense of the endophyte; in the other the endophyte may establish bacterioid bodies which remain enclosed in the lignified cells of the host as long as the nodules live.—B. R. Nebel.

12597. SERMOLLI, RODOLFO PICHI. Aspetti del paesaggio vegetale nell' alto Semièn (Africa Orientale Italiana). [Glimpses of vegetation in the highlands of Italian East Africa.] *Nuovo Giorn. Bot. Ital.* 45(1): CXV-CXXIV. 4 pl., 3 fig. 1938(1939).—The vegetation of these highlands of northern Ethiopia may be described in 4 horizons. (a) The lower grassland, alt. 9,200-9,900 ft., is a meadow or prairie area with low herbs besprinkled with shrubs such as *Hypericum lanceolatum* and, in the higher parts, *Erica arborea* and *Rosa abyssinica*. (b) Ericetum, alt. up to 11,000 ft., a scrub growth of *E. arborea* and *H. lanceolatum*, both 2-4 ft. tall, and with intercalated low herbs. (c) Higher grassland, up to 13,000 ft., composed of grasses, sedges, flowering herbs, and such undershrubs as *Helichrysum*, *Thymus*, and *Blaeria*, with scattered individuals of the tall, narrow *Lobelia rhynchopetalum* trees which give this zone the appearance of a cultivated park or garden. (d) Rock steppe, above 13,000 ft., made up of undershrubs, species of *Helichrysum* and *Senecio*, and of herbs belonging to the Ranunculaceae, Saxifragaceae, Brassicaceae, and Carduaceae, which grow in fissures and between rock masses.—F. Ramaley.

12598. TALBOT, M. W., H. H. BISWELL, and A. L. HORMAY. Fluctuations in the annual vegetation of California. *Ecology* 20(3): 394-402. 2 fig. 1939.—Abrupt and pronounced changes from year to year, in both quantity and composition, characterize the "annual-type" herbaceous vegetation on some 25 million acres of grazing lands in California. These extensive areas contrast sharply with other major forage regions of the West, in 2 respects: (1) the preponderance of annual plants instead of perennials, and (2) the surprising abundance of plants from the Old World. E.g., an extensive survey of the San Joaquin Valley foothills, yielding data from 2,165 plots widely distributed through 11 counties, revealed an average of only about 3% of perennials. According to the same survey, introduced plants in the whole foothill area, all types combined, averaged 58% of the total herbaceous vegetation. Under the variable influence of such factors as arid climate and erratic weather, of livestock grazing and other treatment, this unique herbaceous carpet of annual plants undergoes changes that are both rapid and uncertain in comparison with the more stable perennial plant associations. From year to year species rise and fall in relative abundance, and wide extremes in yield occur. The authors discuss the fluctuations in these "annual types" in the light of quantitative data from the San Joaquin Experimental Range, a cooperative research area for investigation of problems of foothill range management. The paper deals specifically with vegetation changes in exptl. pastures, in fenced exclosures and on the open range—fluctuations that directly concern and complicate range and watershed management.—M. W. Talbot.

12599. THOMPSON, ISABEL. Geographical affinities of the flora of Ohio. *Amer. Midland Nat.* 21(3): 730-751. 106 fig. 1939.—The species that are either disjunct or near the margin of their flora of the state, exclusive of the Gramineae and Cyperaceae, on the basis of their general ranges, may be divided into 5 floristic elements, the northern, the Appalachian, the southern, the coastal plain, and the western. Their presence and distribution within the state can be explained by considering past conditions and migrations as well as present edaphic and climatic conditions. The northern species represent a retreating group that entered the state during Wisconsin and post-

Wisconsin migrations. The Appalachian and southern elements include both stationary and advancing species and are the oldest in the state, having survived glaciation in the unglaciated region. Most of the coastal plain species entered the state rather recently, when conditions were favorable for extensions along the glacial Great Lakes. Those in the Allegheny Plateau are probably relics of the Tertiary flora. The Mississippi embayment species are at the northern limits of their range in Ohio. The western species are relics of xerothermic periods of the past.—*I. Thompson.*

12600. WALLIHAN, ELLIS F. Use of tensiometers for soil moisture measurement in ecological research. *Ecology* 20(3): 403-412. 1 fig. 1939.—The construction and principle of operation of the tensiometer are described. The significance of capillary tension, which this instrument measures, as an index of soil moisture is discussed. Data obtained by the author in a forested soil are presented to illustrate the types of information which can be obtained by use of tensiometers: they measure the force with which water is being held by the soil, without reference to the nature of the soil; their readings can be converted into percentage of soil moisture by proper calibration; they give continuous readings without disturbance of the soil after installation; readings of 2 adjacent tensiometer cups give a measurement of the direction and magnitude of the capillary gradient.—*E. F. Wallihan.*

12601. WEAVER, J. E., and V. H. HOUGEN. Effect of frequent clipping on plant production in prairie and pasture. *Amer. Midland Nat.* 21(2): 396-414. 7 fig. 1939.—The rate of degeneration of native bluestem (*Andropogon*) prairies in eastern Nebraska and decrease in forage production when they degenerate into shortgrass or bluegrass pastures has been studied. The clip quadrat method was employed, a total of 190 meter quadrats being used at 6 stations. Total yields of prairie quadrats cut at frequent intervals during the 1st year exceeded those clipped only at the end of the season by 11-26%. An exception occurred in the *Andropogon furcatus* type, because of the heavy flower-stalk production of the controls. Quadrats closely clipped for 2 seasons always gave lower total yields than a single clipping of the controls. In little bluestem (*A. scoparius*) the yield averaged 46 to 49% less, in big bluestem (*A. furcatus*) 28% less, and in mixed little and big bluestem 43-52% less than the controls. Yields from quadrats frequently clipped during 2 years were likewise much lower than from those similarly clipped for only a single year. In the preceding order of species the yields were 60, 37, and 51% less. When clipping was continued in the same quadrats for 3 years, yields of little bluestem were 68% and mixed bluestems 56% less than the controls, and 42 and 23% less than from similar quadrats clipped for 2 years. This rapid decrease in yield following too close utilization of the forage resulted also in deterioration of underground plant parts. Decrease in dry weight of the plant materials in the surface 4 inches varied from 33 to 41% after 2 years of close clipping, and was 57 to 59% by midsummer of the 3d year, but these decreases were partly due to severe drought. Where upland prairie degenerated into the shortgrass (*Bouteloua gracilis*) type, the yield of clipped quadrats was reduced to about one-half of that of similarly clipped prairie. Where lowland prairie degenerated into the *Bouteloua gracilis*-*Buchloe dactyloides* type or bluegrass (*Poa pratensis*) type, the former prairie yield was reduced to 68%. Because of drought, these data are based upon yields of a single year.—*J. E. Weaver.*

12602. WEAVER, J. E., and WALTER W. HANSEN. Increase of *Sporobolus cryptandrus* in pastures of eastern Nebraska. *Ecology* 20(3): 374-381. 5 fig. 1939.—Sand dropseed (*Sporobolus cryptandrus*) occurred only very sparingly in native pastures of eastern Nebraska before the great drought of 1934. It has since increased so rapidly that it is now one of the most abundant and important pasture grasses. It was not common to true prairie, and its increase has followed the widespread loss by drought of Kentucky bluegrass (*Poa pratensis*) and little bluestem (*Andropogon scoparius*). This species is of wide distribution over the western ranges, renews growth early in spring, develops rapidly, is drought resistant, and is not readily injured by

moderately close grazing. It is a prolific seeder, semi-prostrate flower stalks often escaping being eaten, and under proper grazing soon reclaims pastures where other perennial grasses have died. Resistance to drought is due in part to an excellent root system about 4 feet in extent. In eastern Nebraska, it is of good palatability and produces much forage. Production by means of a series of removable exclosures showed in 1938 that 2.02 tons of this grass per acre were eaten in a well grazed pasture. It is efficient in protecting the soil against loss by erosion.—*J. E. Weaver.*

12603. WERNER, ROGER-GUY. La plasticité écologique des cryptogames méditerranéennes. *Bull. Soc. Bot. France* 85(7/8): 496-499. 1 fig. 1938.—This is viewed entirely from the phytogeographic chart of the Mediterranean based on the vegetational groupings of Emberger, in which cryptogams such as lichens and mosses are arranged alongside of the phanerogams. Each of the species has its optimum in the stage characterized, nevertheless, these plants have a certain ecological plasticity.—*P. D. Strausbaugh.*

12604. WHITMAN, WARREN, and HERBERT C. HANSON. Vegetation on scoria and clay buttes in western North Dakota. *Ecology* 20(3): 455-457. 1939.—The different types of materials predominating in the clay buttes and in the "scoria" buttes of the badlands area of western N. Dakota afford somewhat different conditions for the development of vegetation. The typical vegetation of the scoria butte may be called the *Mentzelia decapetala* and *Juniperus horizontalis* type. With these species, shrubs such as *Rhus trilobata*, *Symphoricarpos occidentalis*, *Chrysothrya odorata*, *Dasiphora fruticosa*, *Shepherdia argentea*, *Prunus melanocarpa*, and *P. pumila* frequently occur. The principal associated grasses are *Agropyron spicatum*, *Muhlenbergia cuspidata*, *Carex filifolia*, *C. eleocharis*, and *C. pennsylvanica* are often present in lesser abundance. The vegetation that is found on the steep slopes of the clay buttes is a community of *Artemisia tridentata*, *Chrysothamnus graveolens*, and *Sarcobatus vermiculatus*. *Eriogonum multiceps* is frequently associated with this vegetation type, as well as *Artemisia longifolia*, *Atriplex confertifolia*, *A. nuttallii*, *A. hastata* and others. The grasses that are most commonly associated with this clay-butte type of vegetation are *Agropyron spicatum* and *Distichlis stricta*. As the forces of wind and water erode and round off the tops of the buttes and the slopes of the sides become more gradual, the grasses increase in prominence and the shrubby species tend to decrease. However, a rounded clay or scoria hill can no longer qualify as a butte, and any successional changes occurring on such formations are distinctly different from changes occurring on scoria or clay buttes.—*W. Whitman.*

12605. ZEIDLER, HANS. Untersuchungen an Mooren im Gebiet des mittleren Mainlaufs. *Zeitschr. Bot.* 34(1): 1-66. 1939.—A stratigraphic and pollen analytic study of moors to the west of the Steigerwald and S.W. of Würzburg. In accordance with the climatic conditions of this region there are flat moors which bear intermediate moorland vegetation only when conditions are against salt retention. The deposits are most marked in Grettstadt moor which dates from the last ice age; in the others, moor deposits began in the pre-arboreal period. The various deposits are correlated on the different moors from the pre-arboreal period. In the Steigerwald, the pine, and to a small extent the spruce, are recognised as native and beech also seems native to the north of Steigerwald but not to the south.—*J. H. Priestley.*

OCEANOGRAPHY

(See also in this issue Entry 12581)

12606. CLARKE, GEORGE L., and DAVID D. BONNET. The influence of temperature on the survival, growth and respiration of *Calanus finmarchicus*. *Biol. Bull.* 76(3): 371-383. 1939.—Laboratory tests on cultures of *Calanus* in relation to the ecology of this species showed that: (a) removal of the culture dishes from constant low temp. to room temp. for daily periods as great as 120 min. was not harmful to the copepods; (b) growth was poorer at 3°C than at 6 to 9°C, but survival was better at the lower temp.; (c) both growth and survival decreased regularly in passing from expts. conducted in the spring to those

in the autumn. Measurements of the respiration of *Calanus* using the Winkler method and the Dixon-Haldane respirometer showed that the magnitude of the O_2 requirement for these animals is of the same order as for those tested by Marshall, Nicholls, and Orr, and possibly is higher than previously reported. The discrepancy between the estimated food requirement of *Calanus* and the average abundance of diatoms therefore still exists but certain possible explanations are discussed.—*Auth. summ.*

12607. GILLAM, A. E., M. S. EL RIDI, and R. S. WIMPENNY. The seasonal variation in biological composition of certain plankton samples from the North Sea in relation to their content of vitamin A, carotenoids, chlorophyll, and total fatty matter. *Jour. Exp. Biol.* 16 (1): 71-88. 1939.—A combined chemical and biological study of the plankton of the southern North Sea was made. 3 vertical hauls, with a Hensen net (silk cone, 60 meshes to the inch) were taken at 6 positions between Flamborough Head and the South-West Patch of the Dogger Bank, monthly from Jan. to Nov., 1936. One haul was used for biological examination, the 2d for detns. of % of ether-soluble matter and the 3d to determine carotenoids, chlorophyll, vit. A and total solids. The biol. results showed that the total plankton depended on 3 diatom outbursts, the largest in May, another little inferior in numbers in Aug., and a small one in Oct. Peridinians and the zooplankton occurred successively in relatively greater numbers with each outburst, but reached their maximum in Aug. when the mass of the plankton was at its greatest. Carotene, chlorophyll and vitamin A were detected in the gross plankton extracts; positive tests for fucoxanthin were obtained only on a few isolated occasions. An examination of a large phytoplankton sample (obtained by tow net) containing *Rhizosolenia styliformis* and *Biddulphia sinensis* only, showed that no vit. A as such was present. Carotene and xanthophyll, however, were present, in the ratio of 1:1.82, which is comparable with the ratio typical of land plants. Total carotenoids equalled 0.1% calculated on dry weight. Of the chemical constituents, the seasonal variation of chlorophyll most nearly coincided with the total mass of the plankton. The carotenoids reached their peak slightly before the maximal biological development; the vit. A content reached its maximum in the month after the spring diatom outburst and much preceded the maximum for the plankton crop as sampled by the Hensen net.—*Auth. summ.*

12608. THIEL, M. E. Naturgeschichte des Seemooses. *Handbuch Seefisch. Nordeuropas* 3(3): 1-34. 25 fig. 1938.—The term sea-moss, as used by the author, includes all technically related hydroid colonies; but the discussion is primarily concerned with Sertularia, as Abietinaria and Thujaria are taken only incidentally in the fishery. Systematically, the species of true sea-moss belong to one of the 3 sub-families of Sertularidae. The structural characteristics, life history, and geographical distribution of the group are adequately and non-technically described. Commercially, *Sertularia cupressina* and *S. argentea* are the important species. They are taken on certain "sea-moss banks" with specially designed tow rakes.—*S. R. Hatton.*

LIMNOLOGY

(See also in this issue Entries 13723, 14220)

12609. EGGLETON, FRANK E. Fresh-water communities. *Amer. Midland Nat.* 21(1): 56-74. 1939.—Two fundamentally different concepts of the interrelationships of organisms and their environment have influenced ecologists. One view stresses the habitat, the other the organisms. The central theme of Limnology is biological productivity. Diversity of fauna and habitats is a marked characteristic of fresh waters. This has resulted in many systems of classification for these habitats and their biotic communities. Lotic communities vary greatly in different types of streams. In intermittent streams the biota is restricted by the peculiar exigencies of the habitat. Species are few and populations manifest marked fluctuations. One of the most powerful factors in lotic communities is current. Lentic communities are of 2 general types—limnetic and benthic. The open waters support groups of organisms which fall into 3 major kinds: neuston, plankton, and nekton. The substratum under the waters from shore-line to deepest

water exhibits 3 well-defined regions—littoral, sublittoral, and profundal. Each of the situations offers a wide variety of habitats and the biotic communities vary accordingly. Present trends of fresh-water investigation are following two well-marked aspects of emphasis. One of these is concerned with applied limnology, the other with basic research. Much more fundamental is the cleavage on the point of emphasis into 3 major phases—the environmental, the biotic, and the truly limnological. A combination of the first 2 is urged as the desirable approach and the most recent development within the field, viz., exptl. work both in the lake and in the laboratory is regarded as especially promising and important. It is high time the subject ceased to be purely observational and began to seek causes.—*F. E. Eggleton.*

12610. GESSNER, F. Die Phosphorarmut der Gewässer und ihre Beziehung zum Kalkgehalt. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(3/4): 202-211. 1 fig. 1939.—Since $Ca_3(PO_4)_2$ is less soluble than $CaCO_3$, addition of the latter substance to natural waters should cause a removal of P from soln. This is confirmed experimentally; an approx. linear relation between addition of $CaCO_3$ and fall in P-content is found. Expts. also show that the removal of bicarbonate from soln. by plants, which under certain circumstances (high Ca) leads to the deposition of $CaCO_3$, also causes a reduction in P. It is suggested that this phenomenon characterizes the "alkaliphilic lakes" of Naumann's classification, and is in part responsible for the general, nearly world-wide deficiency of P in natural waters.—*E. S. Deevey.*

12611. MEUCHE, ALFRED. Die Fauna im Algenbewuchs. Nach Untersuchungen in Littoral ostholsteinischen Seen. *Arch. Hydrobiol.* 34(3): 349-520. 9 fig. 1939.—The fauna of the lasion, or attached mats of material formed of living or dead organisms, was studied in 23 freshwater lakes rich in Ca (over 26 mg/l), in 3 intermediate lakes, in 9 Ca poor lakes (under 10 mg/l) and in 2 brackish lakes. 514 different forms were definitely identified to spp. in 130 samples; 43 spp. came from brackish water, of which 7 were stenohaline forms. Fresh algal growths in May yielded only 22 spp., while similar habitats in Nov. contained 36 spp. and immersed growths as many as 82 spp. The density of the animal population depended upon the amt. of suitable food in the mat. Very few forms were found in the parts of the mat that projected above the water. Many pool forms were present in the mats. The various forms were divided into 3 ecological groups: lasiobiont, lasiophil and lasioxen. 21 spp. had not previously been reported from Germany. 6 new spp. (described elsewhere) were found in the material.—*G. E. Hutchinson.*

12612. MOZLEY, A. The Quill Lakes basin, Saskatchewan, Canada, and its molluscan fauna. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(3/4): 243-249. 1939.—The basin studied includes Big Quill Lake (29 × 17 km.). Little Quill Lake (24 × 10 km.) and several small, normally undrained bodies of water of either permanent or temporary character. A progressive increase in dissolved material is noted as the hydrographic gradient is followed from the periphery to the center (Big Quill Lake). Foam Lake, a small, fresh (total solids 664 p.p.m.) body of water near the periphery, shelters a molluscan fauna consisting of *Lymnaea stagnalis jugularis*, *L. palustris*, *L. caperata*, *Planorbis trivolvis*, *P. exacuus*, *P. arcticus*, *Physa gyrina*, all of which, together with *Musculium securis* and *Pisidium* spp. are found in permanent streams within the basin. *L. palustris* and *L. caperata* are also found in temporary streams. *Lymnaea palustris* and *Physa gyrina* were found living in Little Quill Lake (total solids ca. 9,500 p.p.m.); shells of 6 other spp. were found on the shore. One of these, *Planorbula campestris*, is confined to astatic ponds, and it is suggested that all the shells were introduced by streams and deposited by waves. No mollusca were found living in Big Quill Lake (total solids ca. 16,000 p.p.m.) and shells of *L. palustris* only were found on the shore. The usual sequence of aquatic habitats within the basin is believed to be: temporary ponds—intermittent streams—fresh-water lakes—permanent streams—saline lakes.—*E. S. Deevey.*

12613. PICHLER, W. Unsere Kenntnis von der Thermik

kleiner Gewässer. Thermische Kleingewässertypen. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(3/4): 231-242. 3 fig. 1939.—Small bodies of water are newly defined on thermal grounds as "bodies of water lacking permanent thermal stratification during the warm season." A review of published data together with original observations in the Alps permits a classification into: (1) Puddles (Lachen)—practically no thermal stratification, maximum diurnal temp. variation in summer 25° C, maximum depth 20 cm., bottom receives strong solar radiation. (2) Pools (Tümpel)—thermal stratification interrupted daily by homothermy, maximum temp. variation at surface 15° C, at bottom 5° C, maximum depth 60 cm., bottom receives weak but detectable solar radiation. (3) Ponds (Weiher)—thermal stratification frequently interrupted by storms, maximum temp. variation at surface 10° C, at bottom 2° C, maximum depth over 1 m., bottom receives no detectable solar radiation.—*E. S. Deevey.*

12614. STEINBÖCK, O. Arbeiten über die Limnologie der Hochgebirgsgewässer. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 37(4/5): 467-509. 14 fig. 1938.—The author reviews 10 years of research on alpine and polar limnology, adding much unpublished material. Kryokonite holes are described with emphasis on the "polar" type, typically developed in the pack ice of eastern Greenland (Scoresby Sound). The polar type bears no constant orientation to the sun, and in marine ice the contents are chiefly of organic origin. The organic kryokonite is grayish, primarily composed of diatoms, but when examined in the field other forms are found, e.g., the red snow alga (*Chlamydomonas nivalis*) and Protozoa including *Actinospherium sol* and spp. of *Colpidium*, *Glaucoma*, and *Didinium*. Other examples of the polar type are described from the land glaciers near Scoresby Sound, but the organic component is less important, consisting of plant fragments, presumably wind-blown algae (*Mesotaenium* (*Ancylonema*) *nordenskjöldi*; *Chlamydomonas*) and the Protozoa *Paramecium*, *Didinium*, and *Stylonychia*. The kryokonite from these holes resembles that of the "alpine" type, as descr. from western Greenland, in the predominance of inorganic material, or "dust," but the alpine type differs from the polar in being oriented toward the sun's rays. Glacier-margin lakes are divided into 2 groups on the basis of their colonization by macroscopic organisms, and the differences are ascribed to varying amts. of glacial detritus. The first colonists are Chironomids (esp. the borealpine *Syndiamesa pubitarsus*) and the "glacier flea," *Isotoma saltans*, which frequently lives on the surface film. A typical example of a more productive, clearer glacier-margin lake, that beside the Finstertaler Scharte (2,700 m.), is descr.; under strong insolation shore temps. as high as 7° C were observed. Glacier streams are defined as alpine streams characterized by a heavy load of glacial detritus and an extreme paucity of fauna. The classification of alpine streams is very difficult, and it is suggested that in at least one case the boundary between glacier stream and clear alpine stream is fixed by the vertical range of the trout (*Salmo* (*Trutta*) *fario*). The fact that this faunistic boundary does not fluctuate with the seasonal variations in load can not yet be explained. In the section on alpine lakes, attention is primarily directed to the lakes of the Kühltai region. Those lakes between 2,000 and 2,500 m. are very diverse in hydrography and fauna; 5 lakes contain Salmonids, whose growth rates in the several lakes may be very different; plankton forms a wholly subordinate constituent of the diet of these fish; the bottom fauna is unexpectedly rich and is composed principally of oligochaets and Chironomids. The average number of organisms per sq. m. is: Vorderer Finstertaler See (2,235 m.) 440; Gossenkellensee (2,463 m.) 1,680; Oberer Plenderlesee (2,400 m.) 1,054. These values compare favorably with those from certain of the N. German lakes. Bottom fauna data are also given for the Winnebächsee (2,360 m.), which has an average of 727 organisms per sq. m. Bottom organisms are believed to provide the major food supply for the Salmonid fish. In constructing a scheme for the classification of permanent bodies of standing water in alpine regions, the author rejects criteria of size and morphometry, and relies on thermal characteristics. The proposed classification is be-

lieved to have faunistic corollaries, in that the copepod *Diaptomus bacillifer*, the turbellarian *Castrada luteola*, and the rotifer *Euchlanis dilatata* are characteristic of alpine lakes, while the rotifer *Brachionus* is characteristic of pools.—*E. S. Deevey.*

12615. STRØM, K. M. Conductivity and reaction in Norwegian lake waters. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(3/4): 250-253. 2 fig. 1939.—Specific conductivity and pH values are tabulated for 26 Norwegian lakes, and analysis is based upon regional differences in lithology. Regional peculiarities are more striking in the data on conductivity, notably in respect to the extreme softness of the waters of the northwestern valley lakes. Conductivity measurements are believed to reflect the character of the underlying rocks, rather than of the uppermost soil. The influence of glacial drainage in raising pH values obscures the more fundamental relation between lithology and water type.—*E. S. Deevey.*

12616. ULLYOT, P. Die täglichen Wanderungen der planktonischen Süßwasser-Crustaceen. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(3/4): 262-284. 17 fig. 1939.—Analysis of vertical migration of *Cyclops strenuus* in Windermere, England, during two 24-hr. periods in 1933, was accompanied by approx. simultaneous determination of light-penetration. The Bernheim photometer was employed for the latter investigation, and the use of ray-filters permitted consideration of the penetration of different wavelengths. The diurnal migration within a 40-m. vertical distance was shown to be dependent on varying light-intensity, and the downward migration to be initiated by negative phototropism in strong light of λ 4,000-5,000 Å (blue). The occurrence of 2 maxima of *Cyclops* at the surface, one at dawn and the 2d at dusk, together with the fact that considerable light falls on the surface at night, suggests that the upward migration is caused by positive phototropism in weak light.—*E. S. Deevey.*

12617. VORNATSCHER, JOSEF. Faunistische Untersuchung des Lusthauswassers im Wiener Prater. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 37(4/5): 320-363. 5 fig. 1938.—The "Lusthauswasser" is the abandoned lower segment (length 1 km., width 30-70 m.) of the Vienna Danube Canal, separated from the main stream in 1875. The water level fluctuates with that of the adjacent river, as it does in 2 astatic bodies of water in the vicinity, the "Sandgrube" and the "Weg." Historic and botanical descriptions are given, temp. is briefly discussed, and faunistic studies are summarized by taxonomic groups, with reference to place and season of occurrence. Major groups are: Protozoa (61 spp.); Turbellaria (8 spp.); Rotatoria (15 spp.); Cladocera (33 spp.); Copepoda (18 spp.); Hydracarina (10 spp.); Insecta (102 spp.). Faunistic differences were observed among the 3 localities, notably in respect to Coleoptera; Hydrophilids (9 spp.) were confined to the Lusthauswasser, while 7 Dytiscids occurred only in the Sandgrube, 9 were restricted to the Lusthauswasser, and 8 were common to both. The fauna is classified ecologically under the following categories: ground-water, in mud, over mud, floating wood, surface film, on plants.—*E. S. Deevey.*

WILDLIFE MANAGEMENT—AQUATIC

(See also the section "Pisces"; and Entry 12639)

12618. ALLEN, K. R. A note on the food of pike (*Esox lucius*) in Windermere. *Jour. Animal Ecol.* 8(1): 72-75. 1939.—An examination of stomach contents of 103 pike showed they fed extensively on 4 of 7 abundant fish in the lake, but especially on perch which appeared particularly susceptible to their attacks. The only invertebrate food taken to any extent was hatching nymphs of *Ephemera danica*. The percentage of pike with empty stomachs was high at all times, but especially high in winter.—*S. C. Kendeigh.*

12619. BARROWS, MAYNARD B. Elimination of Yellow Perch from a lake by use of derris root. *Jour. Wildlife Management* 3(2): 131-133. 1939.—*Perca flavescens*. A 37½ acre lake was treated with 540 pounds of derris root, of 5% rotenone content, distributed chiefly from motor boats. The derris powder was also wrapped in dynamite bombs for deep-water treatment and applied around the shoreline by prod poles. First effects were noted in 20 min. and

action was complete in 24 hrs. From subsequent observations, it was concluded that all fish had been killed.—*M. B. Barrows.*

12620. BIGELOW, HENRY B., and WILLIAM C. SCHROEDER. Notes on the fauna above mud bottoms in deep water in the Gulf of Maine. *Biol. Bull.* 76(3): 305-324. 1939.—A survey of the possible shrimp-fishing areas in the Gulf of Maine was made by the Woods Hole Oceanographic Institution under the leadership of Johan Hjort. Using otter trawls of the sort used in the Norwegian shrimp fishery, at 20 stations, it was found that the faunal community just above mud bottom (in depths of 120-228 m.) consisted chiefly of 5 spp. (*Sebastes marinus*, *Merluccius bilinearis*, *Urophycis tenuis*, *Hippoglossoides platessoides*, *Glyptocephalus cynoglossus*) and the shrimp, *Pandalus borealis*. At one station crabs (*Geryon*) outnumbered shrimp. Odd examples of 19 spp. (*Myxine glutinosa*, *Squalus acanthias*, *Raja senta*, *R. stabuliformis*, *R. scabrata*, *Clupea harengus*, *Arctodiellus uncinatus*, *Cyclopterus lumpus*, *Lumpenus lampetraeformis*, *Cryptacanthodes maculatus*, *Pol-lachius virens*, *Gadus callarias*, *Melanogrammus aeglefinus*, *Urophycis chuss*, *U. chesteri*, *Enchelyopus cimbrius*, *Brosme brosme*, *Macrourus bairdii*, *Lophius americanus*) were also caught. The center of the shrimp population in summer lies in the deep bowl west of Jeffries Ledge, the abundance being correlated with the amt. of organic matter in the mud. *Merluccius* was also plentiful there, presumably in pursuit of shrimp. The stock of *Merluccius* was dominated by the yearling—an age group whose habitat in the Gulf of Maine was previously unknown. The other 4 abundant fish were chiefly 2 years old or more and were not restricted to any particular locality. Length-frequency studies of *Sebastes* (with previous information) show the average length to be 7.5 cm. for yearlings, and 18 cm. at the age of 2 years. Yearlings of *Merluccius* average about 17 cm. and the 2-year olds about 25 cm. The estimated combined weight of shrimp and fish in the bowl west of Jeffries Ledge at depths greater than 150 m. averaged 576 lbs. per 1.5 sea miles with an 82-foot trawl, or 55 lbs. per acre of bottom had the 6-inch stratum next the sea floor been included.—*M. Sears.*

12621. BROWN, C. J. D., and CHARLES BUCK, Jr. When do trout and grayling fry begin to take food? *Jour. Wildlife Management* 3(2): 134-140. 1939.—The exptl. fry were kept in standard hatchery troughs (water temp. 47°-52°F) and fed on finely ground beef liver and hearts and salmon carcass meal. Stomach examinations after food was offered show the earliest feeding time from the hatching date to be for: Brown trout (*Salmo trutta*) 23 days, rainbow trout (*S. gairdnerii irideus*) 16 days, cutthroat trout (*S. lewisi*) 14 days, brook trout (*Salvelinus fontinalis*) 23 days, and grayling (*Thymallus montanus*) 4 days. The presence or size of the yolk sac showed no correlation with the initial feeding time in the species studied.—*C. J. D. Brown.*

12622. BURGER, J. WENDELL. Some experiments on the relation of the external environment to the spermatogenic cycle of *Fundulus heteroclitus* (L.). *Biol. Bull.* 77 (1): 96-103. 2 pl. 1939.—No differences in the velocity of the spermatogenic cycle were found between control and exptl. fish subject to the following photoperiodic manipulations provided adequate nutrition was furnished and provided the water temp. (variable between 11° and 18° C) was the same for both groups. The photoperiodic manipulations were: a) 21 days of decreased lighting between June 30 and July 22, b) 37 days of increased lighting between July 22 and Aug. 27 to fish previously treated as in (a), c) 68 days of increased lighting between Oct. 29 and Jan. 4. Sexually inactive fish which received no more than 1½ hrs. of light per day rapidly formed when kept in water whose temp. ranged between 14° and 20° C. Fish similarly treated remained sexually inactive when kept in water of 6-10° C. The temp. of the water is evidently the primary factor of the external environment that influences the spermatogenic cycle. Light as light seems incapable of effecting this cycle.—*J. W. Burger.*

12623. ELSTER, H. J. Über die Bewirtschaftung des Bodensees. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 37 (6): 529-570. 1938.—Concerning himself exclusively with

the "Blaufelchen" [*Coregonus wartmanni*] fishery, the author presents an analysis of present knowledge, current methods, and future management measures, a presentation which is in large part a critique of the conclusions of Wagler. Early in the history of the scientific management of the lake it was shown that the older age-groups are lacking. That this fact indicates an approximately constant ratio between actual population and the intensity of the fishing has been shown by the elimination of several possible alternatives. Older fish can be caught when present, as during years of large catch; no differences in age-frequency are observed within a vertical range of 40 m; distribution of age-frequency in samples taken by different commercial methods is parallel. Although no change of habit with increasing age can be demonstrated, the importance of unequal horizontal distribution can not yet be evaluated. The intensity of fishing can be assessed accurately by age-class statistics, and these statistics show that the annual crop depends upon the size of the year-class, and especially on the number of 3-yr-olds. Particularly large year-classes are also caught as 4-yr-olds. Certain criticisms of the calculated growth-curve are presented. The calculated values are free from the influence of selection, when catch data are employed, and the inception of sexual maturity is not adequately provided for by derived growth-curves. Insufficient evidence is found for the view of Wagler that a specific growth-curve characterizes each *Coregonid* spp., independent of the lake inhabited. In discussing questions of plankton productivity and optimum nourishment for fish the author calls attention to the unreliability of available plankton determinations, and to the variations in the growth rate of the fish in different years. Data presented by Nümann indicate an inverse relation between individual growth-rate and annual crop. In shallow ponds the maximum areal yield of fish is obtained at a population-density which inhibits maximal individual growth. No evidence is believed to exist for Wagler's opinion that growth-variations are determined by temp. rather than by food supply. The evidence accumulated by Wagler, indicating a marked reduction in yield since the Middle Ages, is viewed with considerable skepticism, and Wagler's estimated maximum production for a *Coregonus* lake of 7,500 kg. per sq. km. is not accepted; the author considers it unlikely that the maximum yield of modern times, ca. 1,100 kg. per sq. km., can be greatly exceeded. Measures for the improvement of the yield are discussed, and while the desirability of raising the legal length is recognized, experience in 1937 has shown that this is impracticable while the hawser net (Klusgarn) is used. As a temporary expedient quotas have been imposed, but the prohibition of the hawser net is regarded as the only permanent solution; the suspended net (Schwebsatz) will then be favored, and the legal length can be raised. Artificial reinforcement of natural spawning is regarded as a method for equalizing the loss incurred through the capture of mature fish before spawning has taken place, and through egg-predation by the Trüsche [*Lota vulgaris*]. It is hoped that the reinforcement will be especially effective if the rearing of the young fish is prolonged in large aquaria well-stocked with food.—*E. S. Deevey.*

12624. FOWKE, PHILIP. Trout culture in Ceylon. *Ceylon Jour. Sci. Sect. C, Fish. Bull. Ceylon Fish.* 6: 1-78. 16 pl. 1938.—First attempts to introduce brown trout in 1882 and subsequent attempts from 1886 to 1889 using ova were not successful. In 1892-93 ova were again imported and these efforts were successful. Ova of rainbow trout were first imported in 1899 and this sp. bred freely in elevations of 7,200 feet. The probable lower limit of successful breeding is about 5,800 feet. Except during cold yrs. brown trout breed naturally only occasionally in Ceylon. In the hatchery stream water is preferred over spring water but special filters must be provided to eliminate sediment. Two gravel filters in tile-lined concrete troughs are used. Each filter will handle 300 gallons per hr. Chief causes of mortality are strangulation, starvation, overheating, dropsy, ulcers, fin disease, black ophthalmia, fungus and cannibalism. Ceylon waters are as a rule deficient in lime and this is corrected by placing coral in the water. *Gyrodactylus* at times becomes serious. Once the disease gets established in

a pool larger trout are most seriously attacked. After 2 months the fry are sorted and placed in nursery ponds where they are held for a yr. before being placed in streams. Fresh liver, heart and beef are staple foods, the quantity fed varying with the temp. between 50° and 60°F; 2-3 lbs. per day are given each thousand fish 3-5 in. long; and 4-8 lbs. for each thousand 8-12-inch fish. Fresh shrimp are used to vary the diet and are highly desirable as are small blood worms found in polluted streams. Best results in stream stocking are obtained with 5-6 inch fry. Transportation difficulties prevent stocking large fish. Large containers are infeasible because some transportation is by man-power. Heavy timber cutting and forest fires on the watersheds of trout streams resulted in erosion which seriously damaged the streams as trout habitat. The injury persists many years after reforestation. Survival in streams damaged by this erosion is extremely small. Stream improvement includes temporary log and sand bag weirs as well as permanent masonry structures. Because the natural stream fauna in Ceylon has developed without predatory fish, extreme care must be used to prevent overstocking with trout and subsequent elimination of food organisms. Brown trout only are stocked at high elevations where low temps. inhibit growth of food organisms. Since brown trout seldom breed in Ceylon, populations are easily controlled. At lower elevations where food production is higher, rainbow trout are stocked and population control achieved by netting or heavy fishing. Exhaustion of indigenous food supply because of overstocking is considered a major catastrophe. Some attempt has been made to study fish movement by means of marked fish but these attempts have been generally unsatisfactory. Rainbow trout commonly disappear from the higher trout streams after attaining large size. Scale and vertebrae counts indicate the trout called "rainbow" are in fact "cut-throat" trout and hence migrate to the sea. There is no evidence that the trout return once they have gone to the sea. Natural enemies include the otter, the brown fish owl, kingfishers and cormorants. Poisoning or drugging of fish is a common method of poaching employed by natives. In 17 years 3½ miles of water has yielded 91,927 fish. Sizes range up to 14 pounds, 4½ ounces.—*I. H. Sims.*

12625. HICKLING, C. F. The selective action of the drift-net on the Cornish pilchard. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(1): 67-80. 1939.—Drift nets having meshes of different sizes have a well marked selective action on the pilchards caught. This action shows itself not only on the size, age, and weight of the fish caught, and on the apparent sex-ratio, but on the apparent rate of growth. The larger mesh selects the larger fish of each age, thus giving a higher apparent rate of growth than is found among the fish selected by the smaller mesh. Further, the apparent rate of growth is affected through the agency of "Lee's phenomenon," since the smaller mesh selects the younger fish, the larger mesh the older fish.—*C. F. Hickling.*

12626. HUNTSMAN, A. G. Salmon for angling in the Margaree river. *Fish. Res. Bd. Canada Bull.* 57: 1-75. 1939.—Low catches of salmon (*Salmo salar*) in the river early in the season (June to Aug.), while nets are operated on the coast outside, are not due to the nets but depend upon sea temp., wind, shape of estuary, and freshets. Capture by coastal nets affects angling only by decreasing the abundance of the salmon stock as a whole along the coast, or of a lot of salmon that happens to be exposed to conditions causing their entrance into the river. The results of tagging salmon from the nets in 1935, 1936 and 1937 show that elimination of the 10 nets nearest the river, taking 800 to 1,000 salmon per year, would add from 30 to 90 salmon per year to the angling catch, an increase of perhaps 3.5 to 5%. Low winter temp. of the neighbouring sea, in part the result of drifting ice, prevents the salmon appearing on the coast until about the beginning of June. Onshore (northwesterly) winds concentrate the salmon along the coast. Salmon concentrate where the sea has the greatest proportion of water from the river, e.g., near the narrow mouth of the estuary with out-flowing estuarial water during ebb-tide. Northerly wind holds this close to the mouth, facilitating entrance of the salmon. In currents turbulent from contact with stationary objects, salmon point up-stream and gain or lose ground as the strength

of the current is less or more than their cruising speed. Increased flow or turbulence incites them to greater activity, even to the leaping of falls, thus causing them to ascend rivers. Freshets therefore are important, the salmon ascending as the freshet subsides.—*A. G. Huntsman.*

12627. JANSSEN, JOHN F. Jr. Two years of sardine tagging in California. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(1): 48-66. 7 fig. 1939.—From March, 1936 to June, 1938, 53,352 sardines were tagged on the coast of California. The tag used is a nickel plated steel strip placed inside the body cavity of the fish. It is recovered by means of electro-magnets in meal lines of sardine reduction plants. Up to July, 1938, these tags have yielded 1,334 recoveries. Most returns have been from fish caught soon after tagging in the same fishing region as tagged. However, 258 tags from southern California fish have been recovered in central California, and 30 in Oregon, Washington and British Columbia. Conversely, 10 British Columbia tags and one Oregon tag have been taken in California. In addition, 8 central California tags were recovered in southern California. These recoveries indicate a summer northward movement and a southward movement during the late fall and winter. Recoveries show that the larger fish make longer migrations. An as yet unknown proportion of the tags is not recovered due to shedding of tags, death of fish as a result of tagging, and inefficiencies in the methods of recovery.—*J. F. Janssen, Jr.*

12628. MacGINITIE, G. E. Some effects of fresh water on the fauna of a marine harbor. *Amer. Midland Nat.* 21 (3): 681-686. 1939.—The combined effect of flood waters from a break in the levee of the Santa Ana River and the run-off from the hills surrounding Newport Bay, California, in March, 1938, killed a great many marine animals within the harbor, while others were able to endure the exposure to the fresh water without any apparent ill effects. In the yacht anchorage about 2 miles from the entrance of the bay the animals were killed to a depth of 6 ft. 9 in., which indicates that the border line between the floating fresh water and the underlying ocean water may be sharp. A table listing the effects on the more important animals is given. In general, animals which are able to close out the fresh water and those which are tubicolous or live in burrows underground are unharmed, while the unprotected animals are, for the most part, killed. Ten months later a re-checking of the marine life within the bay showed that all animals were again re-established and abundant.—*G. E. MacGinitie.*

12629. MARSHALL, S. M., A. G. NICHOLLS, and A. P. ORR. On the growth and feeding of young herring in the Clyde. *Jour. Marine Biol. Assoc. United Kingdom* 23(2): 427-455. 1939.—Two groups of young herring (*Clupea harengus*) are found in the Clyde. One, the offshore group, has been identified as Clyde spring-spawned herring; the other, the inshore type, is of unknown origin. The 2 groups are distinguished by differences in size and identified as belonging to different races by vertebral counts. The offshore herring which metamorphose at the end of May when 40-50 mm. long reached a length of 90-100 mm. in winter. The inshore fish which were about 50 mm. long in May reached a length of about 130 mm. in winter. Equations are given showing the relation between length and weight for inshore and offshore herring during the growing and non-growing periods. Determinations were made of water, fat, protein and ash contents of inshore herring. The fat content rises in summer and falls during the winter. It varies inversely with the water content. The fat content continues to increase for some weeks after growth in length has stopped in winter and rises also in spring some time before increase in length begins again. The food was examined throughout the year and compared with plankton hauls. It consisted mainly of copepods although other organisms were common at times when abundant in the plankton. A series of hauls made over a night showed that herring were most abundant inshore at dusk and dawn and contained most food from 7-11 p.m.—*Authors.*

12630. MATTHEWS, SAMUEL A. The effects of light and temperature on the male sexual cycle in *Fundulus*. *Biol. Bull.* 77(1): 92-95. 1939.—Male *Fundulus* maintained in a light-proof tank developed sperm at the same time as

did control animals in the light. Those maintained at 5.5° C showed retardation of spermatogenesis as compared with animals kept at 21°.—S. A. Matthews.

12631. ROUGHLEY, T. C. A review of the scientific investigation of the fisheries of New South Wales. (Presidential address). *Proc. Linn. Soc. N. S. Wales* 64(1/2): i-xxvii. 1939.—A brief review of the following investigations is given: (i) The Commonwealth trawling investigations from 1909 to 1914, which paved the way for commercial trawling on the Australian coast; and the development of the trawling industry. (ii) Recent investigations of the productivity of the sea in the neighbourhood of Sydney as detd. by the quantity and the fluctuations of the plankton; the influence on the plankton of the phosphate and nitrate content of the water; and a comparison of the plankton production and variation compared with that of the English Channel and the North Sea. (iii) The spawning and development of the Australian pilchard (*Sardinops neopilchardus*); the growth and food types of the tiger flathead (*Neoplatycephalus macrodon*), the principal food-fish caught by the New South Wales trawlers; the breeding habits and life history of the king prawn (*Penaeus plebejus*); the artificial propagation of the Murray cod (*Maccullochella macquariensis*); the investigation of a winter mortality of oysters, and the life history of the commercial oyster of New South Wales (*Ostrea commercialis*). Finally, the plan and scope of the investigations of the Fisheries Section of the Council for Scientific and Industrial Research are discussed.—T. C. Roughley.

12632. WHITE, H. C. Bird control to increase the Margaree river salmon. *Fish. Res. Bd. Canada Bull.* 58. 1-30. 8 fig. 1939.—Analyses of 591 stomachs and stomach pellets of wild birds feeding along salmon (*Salmo salar*) streams (551 from the Margaree river, Cape Breton Island) indicated that fish-eating birds, particularly kingfishers (*Megaceryle alcyon*) and mergansers (*Mergus* spp.) were removing a large proportion of the young salmon. A conservative estimate was that in 1935 at least 880,000 young salmon and trout were required by these species for rearing their young along the Northeast branch of the Margaree river. An expt. to test the effectiveness of control of fish-eating birds in increasing the numbers of salmon smolts descending toward the sea was carried out on Forest Glen brook which is a tributary of the Northeast Margaree and drains a high tableland about 30 sq. mi. in area. Following years of unrestricted feeding by the birds, 1,834 smolts were taken by trap when leaving the brook in the spring of 1937. The birds were eliminated for one year, thus protecting during their last year in the brook the young salmon descending the next spring, over 90% of which were 3 yrs. old. When trapped and counted in the spring of 1938 these smolts numbered 4,065, an increase of more than 120% over

the number without bird control. The trout (*Salvelinus fontinalis*) also increased in numbers in the brook and the larger of these ate the young salmon even in the smolt stage.—A. G. Huntsman.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 12469, 12632, 14202)

12634. HAMERSTROM, F. N. Jr., and JAMES BLAKE. Central Wisconsin muskrat study. *Amer. Midland Nat.* 21(2): 514-520. 1939.—Muskrats (*Ondatra zibethica*) on the 100,000 acre Central Wisconsin Game Project, Necedah, were practically confined to 200 miles of drainage ditches, as the result of an earlier drainage-for-agriculture boom. Repeated surveys during 2 springs, 2 summers, and 1 autumn showed that (1) ditches which cut through shallow marshes and low sand islands provided the best muskrat habitats, (2) well shaded and swift-running main ditches, and those through deep peat, were inferior, (3) water losses, from a spring flood stage, continued throughout the year, greatly reducing the potential muskrat range, (4) shallow ditch heads and laterals were preferred for breeding but dried up during summer, resulting in a constantly shifting population, (5) beaver ponds and water holes in bends and behind drift jams gave a scattering of fairly permanent breeding areas, (6) winter losses, because of unbalanced food and water supplies, were drastic. 3 important winter foods were noted, namely *Carex crinita*, *C. rostrata*, and tubers of *Lycopodium uniflorum*, the last of which was heavily eaten at all seasons. Food habits for all seasons are discussed. More constant water levels and a better distribution of winter foods are needed to correct the situation.—F. N. Hamerstrom, Jr.

12635. PARKINS, A. E., and J. R. WHITAKER (Editors). Our natural resources and their conservation. 2nd ed. xiv + 647p. 118 fig. John Wiley and Sons, Inc.: New York, 1939. Pr. \$4.—This revised edition of a collaborative work of 23 contributors affords an opportunity for reduction in duplication and for cross references not feasible when the first edition (1936) was issued. Statistical data have been brought up to date wherever available. A number of chapters have been revised and a new one on fisheries of the future has been added. In the interval between editions, progress in the fields of crop control and soil conservation has been extensive and significant. Cooperation of sportsmen with wildlife conservationists has developed. Great advances have been made in the development and utilization of recreational facilities. Science has made possible noteworthy advances in utilization of wastes especially in the recovery of metals, better conservation of coal, petroleum and its products, and in the conservation of human life.—C. A. Kofoid.

BIOLOGICAL ABSTRACTS

Editor-in-Chief, JOHN E. FLYNN; Assistant Editor, JEAN MACCREIGHT

VOLUME 13

NOVEMBER, 1939

Entries 14313-16114

NUMBER 9

GENERAL BIOLOGY

Editors: A. H. GRAVES, *Plant*; C. A. KOFOID, *Animal*

(See also in this issue Entries 14324, 14335, 14339, 14340, 14342, 15410, 15482, 15581, 15884, 16060, 16098, 16107)

PHILOSOPHY OF BIOLOGY

14313. CANELLA, MARIO F. Orientamenti della moderna biologia. Micromerismo od organicismo? Mutazionismo o lamarckismo? [Orientation of modern biology, micromerism or holism? Mutationism or Lamarckism?] 141p. Nicola Zanichelli: Bologna, 1939.—The book is an argument for what the author calls "eclectic Lamarckism." He concludes that the validity of the Lamarckian theory (not as restricted by followers of Lamarck) is still an open question, and that the theory makes an excellent working hypothesis for biological work in general. Part I, of 3 chapters, discusses the tendency of the biological discipline to break up into practically unrelated specialties, the specialists frequently reaching contradictory conclusions; e.g., the Morgan school of strict genetics cannot explain embryological processes, and largely ignores consideration of the organism-as-a-whole without which embryology cannot be understood or explained; and formal genetics cannot explain the facts of evolution. Part II, in 3 chapters, discusses "eclectic Lamarckism" of broad scope, "not without doubts and reservations, and not excluding Darwinian, Eimerian, nor Devriesian principles"; the organism is the unit from the beginning of development and this concept fits the theory of Lamarck and not the gene theory; that living organisms are in fact ordinarily adapted to life in their particular environments, and that this adaptation is not only physical but also functional, or in a sense "mental," can best be explained by a broad Lamarckism (not a strict or narrow form of the theory); since the concept of a "character" is largely subjective, and since the concept of an "acquired character" may properly be broadened to include reactions by the organism not directly or obviously related to the environmental causes, the validity of a broad Lamarckism remains an open question, and since this is the most inclusive theory that deals with the organism as a unit, it remains the best working hypothesis for biology in general. The book is summarized in a final chapter. The work of 196 authors is quoted or referred to in the text.—R. M. Bond.

MICROSCOPY, INSTRUMENTS, TECHNIQUE

14314. DENNIS, H. A simple stroboscope. *Jour. Quekett Microsc. Club* Ser. 4. 1(2): 101-104. 1 pl., 3 fig. 1933.—The mechanical details of a simple improvised apparatus are described.—W. C. Tobie.

14315. PRAT, S., and J. SCHLEMMER. Electrophotography. *Jour. Biol. Photogr. Assoc.* 7(4): 145-148. 2 pl. 1939.—A sandwich is made of a plate electrode, sensitized plate or film, leaf, or other object to be electrographed, in contact with the photographic emulsion, a glass plate and the other electrode. The electrodes are connected to the secondary of an induction coil giving 15,000 to 25,000 volts. The exposure is made by running the current 10 sec. to a minute. The plate, film or paper is developed with the usual photographic solns. The pictures show the radiation from the edges of the objects and some details of the leaf fibrovascular bundles. Electrophotography is of value in showing the regions of discharge of tissues from localized densities and for study of the surfaces of metals.—O. W. Richards.

TAXONOMY AND NOMENCLATURE

14316. SABROSKY, CURTIS W. The nomenclature of categories lower than species. *Ent. News* 50(7): 197-203. 1939.—Four conflicting interpretations of the International Rules of Zoological Nomenclature, *in re* infra-specific categories, are briefly summarized. Three problems therein—the meaning of "subspecies" in the Rules, the question of what is namable, and the recognition of polynomials—are regarded as of paramount importance, deserving and demanding immediate ruling or agreement to clarify the situation. Acceptance of all past properly proposed names is considered advisable, regardless of what ruling is made for the future, in order to prevent needless confusion in the literature.—C. W. Sabrosky.

CONSERVATION AND NATURE STUDY

14317. GUSTAFSON, A. F., H. RIES, C. H. GUISE, and W. J. HAMILTON, Jr. Conservation in the United States. xi+445p. Frontispiece, 232 fig. Comstock Publishing Co., Inc.: Ithaca, 1939. Pr. \$3.—The book was prepared by members of the faculty of Cornell Univ., apparently as a textbook for a general course in the conservation of natural resources for use by high schools or college freshmen. It is not a reference text although 75 titles for supplementary reading are listed at the end of the book. From 10 to 70 questions, listed at the end of each chapter, serve as review questions for the chapter material. There is an introduction of 14p. stating the nature of the resources of the U.S., and giving an historical summary of the conservation movement in America. The remainder of the book is divided into 4 parts: Part I (140p.), Conservation of Soil and Water Resources, by A. F. GUSTAFSON, treats the soil, its depletion, erosion, and conservation, and the uses and conservation of water; II (98p.), Conservation of Forests, Parks, and Grazing Lands, by G. H. GUISE, treats forest resources, their utilization, depletion, and conservation, and discusses state and national parks and western grazing lands; III (85p.), Conservation of Wildlife, by W. J. HAMILTON, discusses fish and fisheries, game and fur resources, and the conservation of other useful wildlife; IV (75p.), Conservation of Mineral Resources, by H. RIES, treats mineral resources, the metals, coal, petroleum and natural gas, and the non-metallic minerals. An attempt is made to give for each resource its potential value, the factors which have influenced its depletion and methods by which it may be reasonably conserved, and, in the case of renewable resources such as forests and wildlife, how it can be restored.—E. H. Graham.

14318. MORGAN, ANN HAVEN. Field book of animals in winter. xv+527p. Frontispiece, 25 pl. (4 col.), 257 fig. G. P. Putnam's Sons: New York, 1939. Pr. \$3.50.—This most recent addition to Putnam's pocket-size Nature field books is adapted to the needs of both the inquiring amateur interested in animals encountered casually in woods and fields, and to the more deliberate investigator who sets forth with notebook and collecting kit in hand. The first 6 chapters are devoted to general discussions of activities of animals in winter, seasonal migrations, hibernation, winter communities of land animals, and seasonal changes in water

and in fresh-water animals. These are followed by 14 chapters dealing with winter habits of invertebrates, taken up, for the most part, in phylogenetic sequence, and 5 chapters on vertebrates. The 4 plates by R. T. PETERSON contain miniatures in color of 83 species of birds. Twenty-one pages of references and a comprehensive index conclude the volume.—*M. J. Fisher.*

MUSEUMS, BOTANICAL AND ZOOLOGICAL GARDENS, AQUARIA, ETC.

14319. CALVER, HOMER N. The exhibit medium. *Amer. Jour. Publ. Health* 29(4): 341-346. 1939.—Notes on the preparation of displays and exhibits, with particular reference to those in public health.

TEXTS AND EDUCATION

14320. CHILD, GEORGE. Visual outline of general biology. iv+97p. Longmans, Green and Co.: New York. 1939. Pr. \$75.—This is a syllabus of biological facts concerning the general properties of living things, nutrition, irritability, reproduction, heredity, evolution, and the history of biology, with an appendix on classification of plants and animals and a list of works of reference. It is biology boiled down and crystallized.—*C. A. Kofoed.*

MISCELLANEOUS

14321. LOEWENTHAL, L. J. A., and W. A. WILSON. The problems of chance in medicine and research. *Brit. Med. Jour.* 1939(4097): 110-112. 1939.—A table of "smallest eventuality," based on the factorial method, is given for ready reference so that the clinician or research worker can decide easily and quickly whether his results are statistically significant. The desirability of checking conclusions by such a table is illustrated by applying it to the data in selected reports from current literature. Some data do not justify their author's deductions.—*J. B. Paton.*

14322. ROSTAND, JEAN. Biologie et médecine. 219p. 5 fig. Librairie Gallimard: Paris, 1939. Pr. 25fr.—This is volume 11 in *L'Avenir de la Science*, edited by the author of this number. It deals primarily with the genetic aspect of disease in man in the main, but to a limited extent in experimental animals. It falls into sections concerned, respectively, with the heredity of morbid characters, the correction of genetic defects, the effect of acquired diseases upon inheritance, genetics and infection, the virus-proteins,

and cancer and genetics. In the first, the author deals with typical cases of patterns of inheritance of anatomical and physiological defects of man, sex-limited inheritance, types of genes, gene mutation, lethal and sublethal genes, multiple effects of a single gene, morbid characters determined by several genes, identical defects due to different genes, different effects due to the same gene, influence of the genetic and the external environments, chromosome anomalies, the origin of morbid genes by mutation, and gives a classified list of 65 mendelizing morbid characters. Part 2 cites the corrective effects of hormones upon certain genetic defects in man and insects and the palliative effects of opotherapy. Part 3 discusses transmission of infections in sex cells; the non-inheritance of lesions even when incited in the embryonic stage, as in the experiments of Guyer and Smith; and arguments against the induction of mutations by the toxins of infectious diseases and telegony. Part 4 contrasts the non-transmission of acquired resistance of the male parent with the transmission for a brief time of such resistance by the mother to the offspring. Natural innate resistances to specific diseases differ materially between races of men, as in the case of malaria in Ceylon where mortality of whites was from 3 to 25 fold that of colored races. Genetic factors determine resistance to tuberculosis; identical twins respond alike to the infection in 70% of the instances, non-identicals in only 25%. Laboratory animals exhibit comparable genetic differences under controlled experiment. Comparable genetic fixation of characteristics appears in pure lines of bacteria isolated from heterogeneous populations and lasting mutations occur among them as in the case of higher organisms. In Part 5 the author expresses doubts as to the existence of endogenous origins of the virus-proteins. The last section is an extended review of facts and theories concerning the part heredity plays in cancer based on family records, cancer in identical and non-identical twins, the inheritance of predisposition to cancer, and cancer in mice and *Drosophila*, and its mendelian inheritance in hybrid fish. He also defends the theory of the spontaneous origin of cancer by somatic mutation among the different types of cells.—*C. A. Kofoed.*

14323. RUSK, ROGERS D. Les atomes, les hommes et les étoiles. Transl. by L. HERVÉ and A.-M. PETITJEAN. 253p. Librairie Gallimard: Paris, 1939. Pr. 27fr.—A translation of *Atoms, Men, and Stars* with the omission of 4 chapters.—*C. A. Kofoed.*

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 14338, 15002, 15410, 15429, 15696)

HISTORY

14324. ANDERSON, M. D. Animal carvings in British churches. x+99p. Frontispiece, 42 fig. Cambridge University Press: Cambridge, 1938. Pr. \$1.50.—The medieval lore about animals, domestic, native, exotic, and legendary, was recorded not only in the bestiaries but appears in the carvings in stone and wood in gargoyles, on doors, bench ends, and misericords of cathedrals, churches, and abbeys for the moral and religious instruction and perhaps amusement of the unlettered. This book is an illustrated catalogue of the natural and unnatural history thus recorded in the English churches. As to their origin, these carvings fall into the classes of (1) animals of personal symbolism, (2) the bestiaries as in the *Physiologus*, (3) animal romances such as *Reynard the Fox*, (4) animals adopted in the heraldic devices of royalty, nobility, trade guilds, and communities, and (5) animals studied from nature. To these are added human monstrosities, such as are summarized in the *Travels of Mandeville*, and grotesques largely derived from medieval theology such as the Lincoln Imp. The alphabetical list of animals found in the carvings includes 81 of which 17 are mythical. For each of these the churches and the architectural details in which they are represented are catalogued. The illustrations are abundant and well executed. The discussion of sources includes an account of medieval animal lore, especially of bestiaries.—*C. A. Kofoed.*

14325. GORDON, B. L. Oculists and oculists. *Arch. Ophthalm.* 22(1): 25-65. 1939.—Before anatomy demonstrated the connection of the bodily organs to the brain and spinal cord, and before physiology defined the functions of the brain and cord, it was believed that the activity of the bodily organs was controlled by supernatural forces. The eye especially was considered to be dominated by such forces. Its complicated and misunderstood mechanism lent itself to all kinds of speculative superstition. Disease was looked upon as caused by demonic possession of the body, as a punishment for violating religious rites. The term "demonic possession," in connection with disease, however, was not taken literally by all ancients. It is known that as early as the first century, Varro and Columella projected a theory that disease originated from the inhalation into the system of certain invisible creatures. Some Talmudic teachers used the expression "invisible demons," to convey the idea of demonic possession in a sense analogous to our modern bacteriologic concept of disease. "Every inch of space in the air," stated a Talmudist, "is filled with demons who are ready to strike a person and inflict disease; the Lord has created angels to counteract the harmful effect of the demon." In the light of the science of bacteriology, this reference is significant; it brings to mind a picture of malevolent bacteria and benevolent phagocytes or destroyers of the pathogenic bacteria.—*B. L. Gordon.*

BIOGRAPHY

14326. A. A. C. E. M. Edward Milles Nelson. Born January 24th, 1851. Died July 20th, 1938. *Jour. Quekett Microsc. Club Ser. 4. 1(2): 106-110. 1 pl. 1938.*—An obituary.

14327. DEAN, GEO. A. Warren Knaus. *Jour. Kansas Ent. Soc. 11(1): 1-3. 1938.*—A biographic sketch. Warren Knaus was born in Jay County, near Liber, Indiana, in 1858; he died June 28, 1937. He made an excellent collection of North American Coleoptera, consisting of nearly 10,000 spp. and nearly 90,000 specimens, which he willed to the Kansas State College.—V. M. Tanner.

14328. LASSEUR, PH. Jean Beauverie (1874-1938). *Son oeuvre microbiologique. Bull. Assoc. Diplômés Microbiol. Fac. Pharm. Nancy 17. 29-33. 1938.*—An obituary and brief summary of B's work.—W. C. Tobie.

14329. LASSEUR, PH. David H. Bergey (1860-1937). *Bull. Assoc. Diplômés Microbiol. Fac. Pharm. Nancy 17. 34-35. 1938.*—A brief obituary of this distinguished bacteriologist.—W. C. Tobie.

14330. OBERHOLSER, HARRY C. Samuel Prentiss Baldwin. *Cardinal 5(2): 43-44. 1939.*—A biographical note

of the American pioneer of systematic bird-banding, and the founder of the Baldwin Bird Research Laboratory, who died Dec. 31, 1938.—D. S. Lehman.

14331. ANONYMOUS. Buffon. With selected sections and prefaces by A.-M. PETITJEAN. 338p. Librairie Gallimard: Paris, 1939.—This includes 22 selections from Buffon's *L'Histoire Naturelle*, selected with reference to significance, content, and style, and the full text of his *Discours à l'Académie Française*. To these are added a brief sketch of the life of Buffon, an analysis of his character, replies to his critics, a discussion of his style, an account of his method of work, and examples of his successive revisions of his text. His letter to the Empress of Russia is reprinted and the comments of Mornet, Condorcet, and Sainte Beuve are quoted. This volume is one in *Les Grandes Pages de la Science*, edited by Jean Rostand. It affords to the enquirer concerning Buffon a critical selection of his writings by an admirer, and an interesting account of this eminent and influential figure in French science and in literature made in the light of modern science.—C. A. Kofoid.

14332. ANONYMOUS. Charles Cyril Okell [1888-1939]. *Jour. Path. and Bact. 48(3): 611-620. 1939.*

BIBLIOGRAPHY

Editors: CLARIBEL R. BARNETT AND EILEEN R. CUNNINGHAM

(See also in this issue Entries 14331, 15002, 15459, 15657, 16024)

14333. AGRONOMIA LUSITANA. Vol. 1, Number 1 (100 pages), 1939. Four issues per yr. publ. by the Estação Agronómica Nacional: Lisbon.—The following papers comprise the first issue: Mutações somáticas em variedades Portuguesas de pomóideas, by J. VIEIRA NATIVIDADE; On Ecdysis in the African Migratory Locust, by A. J. DUARTE; Mycetes aliquot Lusitaniae. II, by EM-MANUEL de SOUSA da CAMARA and CARLOS GOMES da LUZ; Estudos sobre a *Puccinia anomala* Rost. III. Acção dos factores ambientes sobre o comportamento das raças fisiológicas, by BRANQUINHO d'OLIVEIRA; and Inoculações experimentais com o *Bacterium savastanoi* E. F. Smith e o *Bacterium savastanoi* var. *fraxini* N. A. Brown, by MARIA de LOURDES d'OLIVEIRA.

14334. BRIMLEY, C. S. A partial bibliography of North Carolina zoology. *Jour. Elisha Mitchell Sci. Soc. 54(2): 319-341. 1938.*

14335. De VRIES, LOUIS. German-English science dictionary for students in the agricultural, biological and physical sciences. x+473p. McGraw-Hill Book Co., Inc.: New York, 1939. Pr. \$3.—This is a German-English dictionary with about 48,000 entries of terms in the biological and physical sciences prepared with the assistance of 34 members of the graduate faculty of Iowa State College, thus providing for inclusiveness of the terms defined. It is simplified by the omission of compound words, most inflected forms, derivations, and synonyms, except where they illustrate usages in different sciences or contexts. The gender of nouns is indicated. A useful list of general dictionaries, scientific dictionaries, glossaries, and science readers is given.—C. A. Kofoid.

14336. EICHLER, W. Eine bibliographische Symbolik.

Zur wissenschaftlichen Arbeitstechnik. I. *Zool. Anz. 126 (9/10): 268-270. 1939.*—Proposes symbols to represent different biological subjects, as sex, ecology, nutrition, etc., for bibliographic purposes, to indicate the contents of an article.—L. H. Hyman.

14337. LINNAEI, CAROLI. *Systema naturae. I. Regnum animale.* A photographic facsimile of the first vol. of the 10th ed. (1758). 823p. British Museum (Natural History): London, 1939. Pr. 10s 6d.—This reproduces the 10th edition of the *Systema Naturae* (1758) Part I, of Linnaeus, dealing with the animal kingdom, a work of basic importance in systematic zoological work since the binomial system of nomenclature dates from this edition. A few mss. notes in the copy photographed are also reproduced.—C. A. Kofoid.

14338. WADE, J. S. A contribution to a bibliography from 1909 to 1936 of Henry David Thoreau. *Jour. New York Ent. Soc. 47(2): 163-203. 1939.*—This compilation has been prepared to supplement a former bibliography on the same subject by Francis H. Allen, published in 1908. This present bibliography contains approx. 600 references to principal publications of various kinds on or pertaining to Henry David Thoreau (1817-1862), American naturalist, writer, educator, poet and philosopher, which have been issued during the period designated down to Dec. 31st, 1936. Its subdivisions include: I. Bibliographies. II. Books and other material originally written by Thoreau. III. Biographical and critical material pertaining to Thoreau. There are also included in the compilation a considerable number of references to publications, the main subject matter of which does not deal directly with Thoreau, but which incidentally may contain much important discussion concerning him.—J. S. Wade.

EVOLUTION

(See also in this issue Entries 14313, 16033)

14339. FISCHER, W. Die Psyche und die Stammesentwicklung der Tiere. *Zool. Anz. 127(1/2): 1-25. 1939.*—Discusses the rôle of psychic factors in phylogeny. Psychic factors have phylogenetic significance only when they involve futurity. The reactions of Protozoa never concern a future goal and hence psychic factors play no rôle in their evolution. Among worms, echinoderms, and mollusks, behavior is dependent on present and past circumstances and has no future content so that here too habits and instincts have a species-preserving but not a species-altering value. Among arthropods instincts are the chief means of attaining an end. Conditioned actions, as association in bees between nectar and certain flowers, refer not only to the past, but

also to the future. Specialization for environmental factors by way of highly developed instincts reaches its high point among arthropods. Fish are said not to differ much from arthropods in their learning ability. The lowest land vertebrates, the reptiles, readily learn modes of action, as in capture of prey, and such learned actions may have selection value. Among early mammals, the specialization of the sense of smell, and the adoption of plant food, leading to evolution of the teeth, resulted in greater sensitivity to environmental factors. Recollection of past experiences plays an important rôle in behavior, as food-getting, especially in carnivorous mammals whose behavior is of the motor type. Herbivorous mammals are of the sensory

type, whose behavior has greater reference to a goal, and is more selective. Futurity plays a greater and greater rôle as one ascends the mammalian scale, and reaches its maximum in the primates. These will react with reference to a distant or concealed goal or one that must be reached by a roundabout route. A greater ability to utilize past experiences in present behavior results in conservation of energy and movements.—*L. H. Hyman.*

14340. HUXLEY, JULIAN (assisted by JAMES FISHER). The living thoughts of Darwin. 151p. Frontispiece, illus. Longmans, Green and Co.: New York, 1939. Pr. \$1.—This volume in the Living Thoughts Library, edited by Alfred D. Mendel, presents the gist of the ideas of Charles Darwin on natural selection and the descent of man as they bear on the fact and methods of organic evolution. The authors give a brief review of Darwin's life and scientific activities and then present in logical form and sequence, by quotations from *The Origin of Species* and *The Descent of Man*, the thesis of organic evolution as elaborated by deductive and inductive reasoning in these works. Running comment by the editors on the status of Darwin's arguments and evidence is interpolated at pertinent places, as for example, on the subjects of variation, mimicry, and mutations. Quotations illustrative of the method and conclusions of Darwin also are made from his *Formation of Vegetable Mould*, *Fertilization of Orchids*, *Variation of Animals and Plants under Domestication*, and his *Autobiography*. These selections will be exceptionally valuable to biologists seeking a brief but authoritative presentation of Darwinism in Darwin's own words.—*C. A. Kofoid.*

14341. LUDWIG, W. Der Begriff "Selektionsvorteil" und die Schnelligkeit der Selektion. *Zool. Anz.* 126(9/10): 209-222. 1939.—Concerns the question how many generations are required for a mutant having an extremely slight selection advantage to supplant the original sp. The discrepancies in the calculations of various statisticians (Haldane, Fisher, Mittmann) depend upon their varying definitions of the concept "selection advantage"; in particular Mittmann's objections to the author's previous work are answered. A

formula is given on the assumption that the selection advantage is 1/100, i.e., that in the mutant 1 more individual per 1000 will survive than in the original sp. There is a discussion of survival-probability (*FW*) and destruction-probability (*VW*), leading to the conclusion that if *VW* is diminished by a certain fraction, *FW* is increased ($n-1$) times this fraction, where n is the average number of young per mother. Assuming a mutation rate of $1:10^6$ and a selection advantage of the favored mutant of 1%, it is calculated that the mutant would supplant the original form in 4790 generations if the mutant allele is dominant. Theoretically no objections can be raised to pure selection of favorable variations as an explanation of evolution but this of course is no proof that evolution takes place in this way.—*L. H. Hyman.*

14342. RAYMOND, PERCY E. Prehistoric life. xii+324p. 156 fig. Harvard University Press: Cambridge, 1939. Pr. \$5.—This book is the outcome of the beginning course in palaeontology at Harvard. It is dominated by the concept that environment has controlled the progressive evolution of the animal world. The subjects selected are those of more general interest and of basic importance. The treatment is simplified and not inclusive or systematic. In general the order of treatment is that of animal evolution subordinated to that of major ideas such as the first animals and plants, pre-Cambrian life, the beginnings of the chordates, the origin of the vertebrates, the rise of air-breathing vertebrates, from scales to feathers, the first aviators, the ancestry of man, and retrospect and prospect. Five chapters of the 29 are devoted to reptiles and 6 to mammals. The author advocates the echinoderms as near the ancestral line of chordates, discredits the notochord and *Amphioxus* though noting the latter's resemblance to the anaspids, and looks to the ostracoderms for the origin of the Elasmobranchs and ganoids. These succinct generalizations of the palaeontological evidences of the paths of animal evolution are valuable to zoologists and the palaeontologist's ideas of the moulding force of the environment is important to all concerned with the factors in evolution.—*C. A. Kofoid.*

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. McCLUNG, *Animal*

(See also in this issue Entries 14358, 14363, 14372, 15468, 15518, 15523, 15731, 15752, 15993)

GENERAL

14343. DEMEREC, M. Chromosome structure as viewed by a geneticist. *Amer. Nat.* 73(747): 331-338. 1939.—Chromosomes are visualized as composed of a fiber-like chromonema which is structurally similar throughout the whole chromosomal complex and to which are attached various radicals. A segment of the chromonema with a number of radicals forms a molecular unit recognizable through its action as a gene. The whole chromosomal complex forms a sensitively balanced system. The activity of individual genes is determined by their chemical constitution, by the constitution of the whole system and by their position within that system.—*M. Demerec.*

14344. WADDINGTON, C. H. The physico-chemical nature of the chromosome and the gene. *Amer. Nat.* 73(747): 300-314. 1939.—A review of recent work. The paper deals with the fibrous nature of chromosomes, estimates of the size of the gene and of the chromonema, the chemical nature of chromosomes, and the meaning of the term gene in chemical terms. Some discussion is given of the relation between chromosomes and protein and nucleic acid fibers as studied by X-ray analysis. Emphasis is laid on the probable magnitudes of the entities involved, and it is pointed out that the position effect extends over distances very much longer than the chemical interaction between side-chains attached to a protein fiber, with which it is sometimes compared.—*C. H. Waddington.*

PLANT

14345. HAGERUP, O. Studies on the significance of polyploidy. III. *Deschampsia* and *Aira*. *Hereditas* 25(2): 185-192. 1939.—Of the 7 species of *Deschampsia* examined only one, *D. setacea* is diploid ($n=7$); 5—*D. flexuosa*, *D.*

caespitosa, *D. arctica*, *D. pumila*, and *D. bottnica*—are tetraploids ($n=14$); the remaining one is octoploid ($n=28$). The diploid species has a small ecological range; the tetraploids have the widest ecological and geographical range; the octoploid species is alpine and viviparous. Of the 3 *Aira* spp. examined, *praecox* and *caryophyllea* are diploid ($n=7$) and strictly annual; *multiculmis*, which is sometimes confused with *caryophyllea*, is a tetraploid ($n=14$) and is characterized by a more vigorous growth and a longer life.—*F. N. Briggs.*

14346. HEILBORN, OTTO. On the structure of pachytene chromosomes in *Lilium*. *Hereditas* 25(2): 103-108. 1939.—In permanent aceto-carminic smears of pollen mother-cells of *Lilium umbellatum*, prepared according to a special method described elsewhere, the writer has found the pachytene chromosomes most clearly banded with chromatic discs (discoic chromomeres) separated by achromatic material. Some of the chromomeres are very stout "knobs," most of them are slender and clearly discoic. The structure of the pachytene chromosomes of *Lilium* is essentially the same as that of the salivary gland chromosomes of *Drosophila* and other Diptera.—*F. N. Briggs.*

14347. LEVAN, ALBERT. Tetraploidy and octoploidy induced by colchicine in diploid *Petunia*. *Hereditas* 25(2): 109-131. 1939.—Chromosome doubling in diploid *Petunia* was induced in 2 ways: (1) seeds were soaked in from 0.1 to 0.2% soln. of colchicine for 20 hrs., the air being evacuated 3 times to increase penetration and (2) by coating young seedlings with 1% colchicine agar. Of the 2000 seeds soaked, 93 survived, most of these produced mixoploids, many of which were dwarfed. As a result of the agar treatment entire plants occasionally became mixoploid. However, the most common occurrence was that whole plants

developed into tetraploids; 2 pure octoploids were found. The majority of the tetraploids were larger throughout than diploids. The 2 octoploid plants were more robust than the tetraploids, the stems being 3 times as thick but shorter than those of the diploid. The flowers were larger than those of diploid but not so large as tetraploid. The appearance of the stigma, which was greatly enlarged, made it possible to recognize octoploids. The induced tetraploids showed a chromosome morphology and a course of meiosis similar to spontaneous tetraploids. The octoploids had smaller chromosomes and meiosis was characterized by a frequent occurrence of multivalents. Octivalents were not so frequently seen but hexavalents were found in almost every cell. Tetrad formation was irregular. A few plants showed a decided tendency to asynapsis and in one plant the chromosomes were arranged serially end-to-end at first metaphase. The causes of different responses to colchicine by different plants are discussed.—*F. N. Briggs.*

14348. NORDENSKIÖLD, HEDDA. Studies of a haploid rye plant. *Hereditas* 25(2): 204-210. 1939.—One haploid rye plant was found after treating an inbred line 21 hours after pollination with 21°C of heat for 45 min. The plant was small but normal reaching full development the following spring. At 1st metaphase in pollen mother cells, there were 7 univalents, except in 3% of the cases where 1 bivalent was found. The chromosomes were distributed at random at 1st anaphase but 2d anaphase was normal. The plant was both ♂ and ♀ sterile.—*F. N. Briggs.*

ANIMAL

14349. BRACHET, JEAN. Le rôle physiologique et morphogénétique du noyau. Embryologie causale et chimique I. *Actualités Scientifiques et Industrielles* 693. 1-39. 4 fig. Hermann et Cie: Paris, 1938. Pr. 15fr.—This paper reviews the histochemical constitution of the nucleus of the amphibian oocyte, the synthesis of thymonucleic acid during embryonic development, the rôle of the nucleus in the metabolism of the egg, and its rôle in morphogenesis. The localization of thymonucleic acid in the nucleus and of the pentosenucleic acids in the cytoplasm is established but their physiological rôles and the reasons for the localizations are not yet clear. Nucleoli remain a profound enigma beyond the fact that there is an intimate relation between their elaboration and the activities of chromosomes. Nuclear sap is rich in protein sulphhydryls. It plays a part in the formation of the spindle and in morphogenesis. The inductive capacity of the isolated germinative vesicle resides in it. The synthesis of thymonucleic acid during embryonic development is generally established but the mechanism varies with the species. The intervention of the chromosomes in the process is evident. Correlations between genetic constitution and nucleic acid content of the chromosomes have been described. The nucleus is not the center of oxidation nor the reservoir of enzymes. The morphogenic functions of the nucleus are evident from studies of merogonic hybrids, grafts of isolated germinative vesicles, and histochemical analyses of nuclear sap in successive stages of ontogenesis.—*C. A. Kofoed.*

14350. DODDS, K. S. Oogenesis in *Neuroterus baccarum* L. *Genetica* 21: 177-190. 1939.—No doubleness is observed in the chromatin threads before the diffuse state, from which they emerge paired end to end. All chromosomes have terminal centromeres with apparent telosynapsis of the paired univalents. The bivalents then become arranged parallel to the metaphase plate and fuse to form a spindle-shaped mass in the mature egg. Agamic ♀♀ lay 2 types of eggs differing in mode of maturation: in one a polar body is liberated and eggs develop with $2n=10$; in the other no polar bodies are given off and $2n=20$.—*E. W. Lindstrom.*

14351. MILLER, DWIGHT D. Structure and variation of the chromosomes in *Drosophila algonquin*. *Genetics* 24(5): 699-708. Map, 1 pl. 1939.—*D. algonquin* has 5 pairs of chromosomes. Through a study of the salivary gland chromosomes all but one of them have been found to vary as to gene sequence throughout the range of the species. In one of the autosomes there occurs an inversion across the spindle attachment. The salivary gland chromosomes of *D. a.* bear no great resemblance to those of the other *Drosophila* species for which these have been described, with

the exception of 2 closely related species, *D. azteca* and *D. athabasca*.—*D. D. Miller.*

14352. OKSALA, TARVO. Über Tetraploidie der Bind- und Fettgewebe bei den Odonaten ein Beitrag zur Kenntnis der sog. somatischen Polyploidie der Insekten. *Hereditas* 25(2): 132-144. 9 fig. 1939.—Giving a summary of the cases of somatic polyploidy recorded for insects, the author divides them into 3 main groups: (1) Tetra- to 1024- and 2048-ploidy occurring in the Malpighian tubules, fat body, tracheal epithelium, salivary glands, etc. of Heteroptera (*Gerris lateralis*) and Diptera (*Simulium*); (2) polyploidy in the hind-intestinal epithelium of *Culex* larvae (and other Diptera) during which stage the cells do not divide—in the pupal stage cell division and reduction division of the chromosomes occur, the cells finally coming to be di- and tetraploid; (3) tetraploid tracheal tissue and octoploid rectal glands found in 8 species of *Drosophila* and 9 other dipterons (belonging to 5 families); tetraploid hypodermal cells in mycetophilids (Diptera) and *Pteronidea ribesii* (Tenthredinidae, Hymenoptera) and 16-ploid fat cells and oenocytes in the last named species (these cells divide mitotically and keep the degree of polyploidy constant). The 3 possible ways of somatic tissues becoming polyploid are discussed: (a) By cell and nuclear fusion; (b) by nuclear reorganization (mitotic division without cell or nuclear division); (c) the so-called inner division of chromosomes (without cell or nuclear division and without spindle formation). The last type is considered to be the one most likely to be found in insects. The author examined the connective and fat tissues of 15 spp. of Odonata belonging to the Calopterygidae, Agrionidae, Cordulegasteridae, Aeschnidae, and Libellulidae. The 2 tissues mentioned were found to be tetraploid, and polyploidy in Odonata is considered as of the type found in group 3. Polyploidy appears to be characteristic of certain tissues in insects and is apparently a part of the normal differentiation of the tissues since the physiological differences go hand in hand with the anatomical differences in such tissues.—*G. M. Spurlock.*

14353. PFALER, ELVI von. Das Verhalten der Idiochromosomen zweier Lygaeiden. *Acta Soc. Fauna et Flora Fennica* 60: 179-189. 2 fig. 1937.—A comparative study of the idiochromosomes of *Lygaeus equestris* and *Eremocoris erraticus*. Two cytological races of the former are described, in which the Y-chromosome exists as a single element in one race, and as 2 elements in the other. The chromosomal constitution of the 2d species may have been derived through hybridization from *E. plebejus* and some undetermined species.—*P. L. Risley.*

14354. SUBRAMANIAM, M. K. Studies on the structure of the Golgi apparatus. IV. Endostyle of *Branchiostoma indicum*. *Quart. Jour. Microsc. Sci.* 81(3): 429-450. 1 pl., 10 fig. 1939.—The work on *Branchiostoma* was undertaken: (1) to study the relation between the central and the Golgi apparatus in a ciliated cell where the parts of the central apparatus are supposed to be associated with the cilia, and (2) also to see whether any hint as to the mode of evolution of the network can be obtained. The Golgi apparatus occurs as a few small grains having an indefinite distribution in cells at the earliest stage of activity. There is no "Golgi Zone," nor are these elements collected around a centriole. They increase in size and number, and as they do so in many of them the central area becomes brownish. The Golgi elements finally get scattered through the cell. This scattering is soon followed by the appearance of mucus in the chromophobic areas of the elements. Increase in size of secretion droplets leads to rupture of the osmiophilic portion in regions where it is thin, and mucous globules with Golgi caps may be seen in the cytoplasm. Most of the Golgi elements degenerate after mucus formation is completed, and those left behind apparently become reorganized for the next secretory cycle. Examples and results are cited to show that the chromophobic part has nothing to do with the centrosphere. It appears difficult to decide whether the presence of Golgi apparatus in the form of discrete elements is the retention of an invertebrate characteristic by *Branchiostoma*.—*M. K. Subramaniam.*

GENETICS

Editors: ORLAND E. WHITE, *Plant*; SEWALL WRIGHT, *Animal*

(See also in this issue Entries 14322, 14341, 14343, 14344, 14347, 14348, 14351, 14694, 14876, 14923, 15049, 15103, 15105, 15115, 15170, 15468, 15482, 15565, 15570, 15592, 15594, 15604, 15747, 15752, 15792, 15843, 15845, 15853, 15856, 15858, 15860)

PLANT

14355. ANDERSON, EDGAR. Recombination in species crosses. *Genetics* 24(5): 668-698. 1939.—The estimation of total character recombination is presented as a technique for the genetic analysis of crosses between species or races. A series of F_2 's between *Nicotiana glauca* and *N. glauca* were analyzed by this method. The actual recombinations obtained in this expt. represent only a small fraction of the total imaginable combinations of the characters of the 2 species. At least 4 hindrances to character recombination operated in this F_2 -gametic elimination, zygotic elimination, pleiotropism, and linkage. Theoretical considerations lead to the same conclusion as the examination of the data; that recombination in species crosses is limited in the 2d generation to an insignificant fraction of total recombination. The application of these conclusions to practical breeding problems and to the taxonomic recognition of hybridity is discussed. The use of multiple-factor characters as markers for the bulk of the germplasm, in the same way that genes are used to mark loci, is suggested.—E. Anderson.

14356. BELL, G. D. H. A study of the date of ear emergence in barley. *Jour. Agric. Sci.* 29(2): 175-228. 19 fig. 1939.—This paper is concerned primarily in showing that in analyses of hereditary behavior of hybrid progenies, it is desirable to associate a closer study of the nature of physiological characters with genetic behavior. A study of the date of ear emergence in barley was undertaken to illustrate the interrelationship of all biological factors in producing these specific manifestations recognized as plant or animal characters. The object was to discover the rôle of inheritance in determining the number of days from sowing to ear emergence in the following hybrids: (a) Big Wheat Barley \times Pryor's Chevallier, (b) Pryor's Chevallier \times Plumage, (c) Plumage-Archer \times Pryor's Chevallier, (d) Big Wheat Barley \times Goldthorpe, (e) *Hordeum vulgare parallelum* \times *H. spontaneum*, (f) *H. spontaneum* \times *H. intermedium transiens*, (g) *H. vulgare praecox* \times B. 24. To illustrate the significance and importance of time of sowing in studying the inheritance of time of ear emergence, 2 crosses were made (Pryor's Chevallier \times *H. spontaneum*, and Pryor's Chevallier \times B. 24) and the progenies observed when sown at different dates. The evidence offered by behavior of these crosses indicates that the only hereditary character common to all is a tendency to the dominance of earliness of ear emergence. The actual expression of this dominance varies with the parents used in various crosses and with time of sowing. The evidence of these observations supports conclusions of other workers that time of ear emergence is a character which is dependent for its manifestation upon the action of subsidiary or constituent characters with the environment.—T. D. Jarvis.

14357. COLIN, H., et E. BOUGY. Les croisements de sucrières et de fourragères. Dissociation, en F_2 , de l'hybride Kuhn \times Mangold. *Publ. Inst. Belge Amélior. Betterave* 7(2): 28-47. 1939.— F_1 roots of crosses between sugar beet (Kuhn) and stock beet (Mangold) generally had red or orange skin, but in certain lots some with white skins appeared. Shape was usually intermediate. Sugar content slightly exceeded the mean of parents. The root with highest sugar content was the longest. Difficulty was experienced in determining dominance. F_2 beets from seed of orange-colored F_1 , of lowest sugar content, were 20.2% white, 34.2% yellow, and 45.6% red. Mean weight of F_2 roots was 721 g. (949 g. for the Mangold and 499 g. for the Kuhn).—W. W. Robbins.

14358. FOTHERGILL, PHILIP G. Studies in *Viola*. 2. Some irregularities in natural *Viola* hybrids. *Genetica* 21: 153-176. 1939.—Cytological descriptions of abnormalities in a wild population of hybrids between *Viola tricolor* and *V. lutea* are given in detail. Abnormal floral structures are characterized by shrunken and missing masses of tissue, shrunken malformed anthers, and structureless sporogenous

tissue. Hybridity of the plants, resulting in lack of chromosomal balance, may have led to lack of balance of factors governing the metabolism responsible for formation of new tissue. Other irregularities observed are extranuclear bodies in the pollen mother cells and extremely contracted chromosomes.—E. W. Lindstrom.

14359. KARP, M. L. Prakticheskoye Ispolzovanie Inzuchta v S Sh A. [Practical utilization of inbreeding in the U.S.A.] *Selektzia i Semenovodstvo (Plant Breeding and Seed Growing)* 9(2/3): 28-31. 1939.—The author describes the successful application of inbreeding to maize culture in the U.S.A. The work of Jones and Singleton is discussed, and illustrations given. Golden Bantam sweet corn, affected by wilt, and the hybrid "Golden Cross Bantam" grown in same soil unaffected by wilt, are shown. The American experience should encourage more extensive work in USSR. (Comment by Editorial Board in a foot-note: Inbreeding was endorsed long ago by K. A. Timiriazev, and intervarietal hybridization in corn is being done at Dnepropetrovsk and Gorski Stations, and this work is described by V. P. Sokolov, and S. F. Pavlovski in "Report of Ukrainian Grain Institute" (Kuibyshev Institute) in their publication No. 8, 1937. This year it is expected that the production of hybrids will receive considerable attention).—J. W. Pincus.

14360. LEVAN, ALBERT. Studien über die Vererbung der Blütenascheung bei *Petunia*. *Hereditas* 25(2): 145-184. 1939.—The flowers of certain strains of *Petunia* are patterned. The patterns may be symmetrically arranged or they may exhibit an irregular extension. The material dealt with in the present paper may be divided into patterned forms, into constant self-colored, and into indifferent forms. The indifferent ones are not patterned phenotypically but may behave in crosses like patterned ones. After selfing through several generations, or after intercrossing within these 3 groups, the characteristics of each group are maintained. The cross self-colored \times patterned gives self-colored F_1 , and in F_2 the main part of the plant is self-colored. Among 5567 F_2 plants only 11 showed flower pattern. In backcrosses between F_1 (self-colored \times patterned) and patterned forms a varying number of patterned plants appeared. In the described progenies from 0 to 45% patterned plants occurred in all 273 among 1971 plants. After x-ray treatment carried out on seeds of a self-colored line, one sector of a plant showed an extreme type of flower pattern, in fact the flowers were almost pure white. Progeny taken from different parts of this plant showed the character to be genetically induced. The flower patterns are probably not caused by unstable genes, but are due to a number of flicking genes. The inheritance of these genes is rather complicated and may be treated as a kind of quantitative inheritance. At least 4 or 5 recessive polymeric factors for flower pattern must be present.—Auth. summ.

14361. NATIVIDADE, J. VIEIRA. Mutações somáticas em variedades Portuguesas de pomóideas. [Bud mutations in Portuguese pear and apple varieties.] *Agronomia Lusitana* 1(1): 7-21. 2 pl., 2 fig. 1939.—One bud mutation in pear and 3 color mutations in apple, studied in the orchards near Alcobaca, are described. On the pear the mutation occurred on the var. "Carapineira" as a limb variant, the new strain differing from the parent var. in time of maturity (15-20 days later than the normal form) and in the size of the fruits, which are larger than the type. Two types of whole-tree variants, probably originated as limb sports and unintentionally propagated, are described as mutants of the apple var. "Casa Nova de Alcobaca." A striped mutant of the same var. which offers great cultural interest is already spread in the region; the whole surface of the fruit is bright red and the stripes deep red. The 2 other mutants—one uniform red the other colorless—are thought to be worthless.—M. L. d'Oliveira.

14362. PERRY, H. S. Genetic control of xenia in sweet corn. *Jour. Elisha Mitchell Sci. Soc.* 54(2): 187. 1938.

14363. RASMUSSEN, J., and ALBERT LEVAN. Tetraploid sugar beets from colchicine treatments. *Hereditas* 25(2): 97-102. 1939.—Colchicine was used in an attempt to produce tetraploidy in sugar beets by (1) seed treatment, (2) application of colchicine agar to seedlings and 1st-yr. plants, and (3) treatment of shooting seed plants. Methods 1 and 2 gave an immediate effect, but if the plants were left for some time without renewed treatment the effect disappeared quickly. In the 3d method, the tips of shooting stems which were about 50 cm. high were immersed in a 1% aqueous soln. for 24-48 hrs. The treatment was so severe that much of the tip withered away. The surviving tissue contained greatly enlarged cells which were estimated to have from 100 to 500 chromosomes, thus producing flowers too abnormal to be used. Some axillary shoots below the directly treated portion of the stalks contained both diploid and tetraploid sectors. Of 84 seedlings grown, 3 were tetraploid, 13 were triploid.—F. N. Briggs.

14364. RAW, A. R. Intergeneric hybridization. A preliminary note of investigations on the use of colchicine in inducing fertility. *Jour. Dept. Agric. Victoria* 37(1): 50-52. 3 fig. 1939.—The successful induction of complete fertility in the normally totally sterile intergeneric hybrid *Triticum vulgare* × *Agropyron intermedium* by the action of colchicine is reported.—Courtesy *Exp. Sta. Rec.*

14365. STEBBINS, G. L. Jr., and J. A. JENKINS. Apomorphic development in the North American species of *crepis*. *Genetica* 21: 191-224. 1939.—Reproduction by somatic apospory followed by diploid parthenogenesis occurs in the polyploid form. Apomicts, wherein a cell or cells of the integument develop into embryo sacs, may be divided into 3 classes based on frequency and time of apospory: in (1) apospory is infrequent and takes place at the megaspore stage or later; in (2) apospory is the most common procedure and takes place before the megaspore tetrad stage; in (3) apospory always takes place and the egg mother cell never develops beyond the prophase stage. Pollen degeneration may occur but is not correlated with the type of development that takes place in the ovules. Hydration of the aposporic cell suggests water relationships as the mechanism of somatic apospory. Apomictic reproduction, accompanied by the occasional production of segregating hybrids can account for the variability in these species.—E. W. Lindstrom.

ANIMAL (EXCEPT MAN)

14366. ASMUNDSON, V. S. On the measurement and inheritance of sexual maturity in turkeys (*Meleagris gallopavo*). *Amer. Nat.* 73(747): 365-374. 1939.—An analysis of the trapnest records of turkeys for a period of 7 yrs. showed date of 1st egg to be a better measure of sexual maturity in this species than age at 1st egg. Time of hatch, within the usual hatching period of about 2 months, had little influence on date at 1st egg; whereas the later hatched birds started to lay at an earlier age. Two lines that differed significantly in date of 1st egg were established by selection. Reciprocal crosses were made between the 2 lines. The progeny of early ♂ × late ♀ started laying earlier than the progeny of late ♂ × early ♀ but at the same time or later than the ♀♀ in the early maturing line. The ♀♀ in the late maturing line started laying at a later date than the progeny of late ♂ × early ♀. The data for these selected lines and the progeny of reciprocal matings between them show that sexual maturity in turkeys is determined by both sex-linked and autosomal genes. On the basis of differences in the weights (and ages) of chickens and turkeys at the time they start to lay, as compared with their maximum 1st-yr. weight, it is suggested that physical maturity is a less important factor in determining the onset of egg production in turkeys than in chickens and that turkeys have a higher threshold of response to environmental stimuli than do chickens.—V. S. Asmundson.

14367. CUMLEY, RUSSELL W. Precipitin absorption with *Drosophila* antigens. *Amer. Nat.* 73(747): 375-380. 1939.—Antisera were produced in rabbits by inoculation with saline extracts of *Drosophila* species. The antisera to *D. caribbea* and *D. virilis* were absorbed with antigens of *P. caribbea*, *D. virilis*, *D. mulleri*, and *D. melanogaster*. After absorption, the supernatant liquid was collected and tested to determine relatively how much precipitating material had been removed by the absorption. In this

manner, *D. caribbea* and *D. melanogaster* were found to share a relatively high percentage of their antigenic constituents. Likewise, *D. mulleri* and *D. virilis* were found to have much in common. *D. caribbea* and *D. virilis* were found to share relatively small proportions of antigenic constituents. Also, *D. caribbea* and *D. mulleri* were found to be distantly related. In general, the relations implied from these results are in accord with the accepted taxonomic relations.—R. W. Cumley.

14368. EPSTEIN, FEDOR F. Über Modifikationen (Phaenokopien) der Flügelform nach Bestrahlung mit U.-V. Licht *Drosophila*. *Genetica* 21: 225-242. 1939.—Data on wing abnormalities, resembling known mutations, produced by ultra-violet radiation of 2-3 thorax segments of larvae and pupae are presented. No basis for specific differences was found. Different stimuli strengths showed the wing tip more sensitive than wing base. A successive restraint, which progresses from wing base to tip in the course of development was found. U.-v. evidently produces its variations by interrupting trains of gene action. Radiation at various stages of development by interrupting different trains, results in different abnormalities.—E. W. Lindstrom.

14369. FORTUYN, A. B. DROOGLEEVER. A cross of gene environment as a means of studying the inheritance of some quantitative characters in *Mus musculus*. *Genetica* 21: 243-279. 1939.—Three quantitative characters were studied in a cross between 2 entirely unrelated strains of albino *M. musculus*, designated as HTM and WM. Contrasting F₂ groups $\frac{HT/W}{HT/W}$, $\frac{HT/W}{W/HT}$, $\frac{W/HT}{HT/W}$ and $\frac{W/HT}{W/HT}$ were inbred separately to the F₃ generation. Data on foot length indicate a sex inheritance for at least one gene concerned with no evidences of Mendelian segregation. All generations had the same average for number of tail vertebrae but the 4 F₂ groups differed, this being attributed to the selection of modifiers by the breeding schedule.

$\frac{HT/W}{HT/W}$ and $\frac{HT/W}{W/HT}$ appeared to follow HTM while $\frac{W/HT}{HT/W}$ and $\frac{W/HT}{W/HT}$ followed WM in inheritance of number of tail rings. The explanation that HTM, WM, HT/W and W/HT are constant heterozygotes is offered.—E. W. Lindstrom.

14370. GRÜNEBERG, HANS. The linkage relations of a new lethal gene in the rat (*Rattus norvegicus*). *Genetics* 24(5): 732-746. 1939.—A new lethal mutation in the rat causes abnormalities of the cartilage followed by emphysema of the lungs and death during the first 6 weeks of life. The percentage of lethals in F₂ matings is reduced below expectation by selective mortality after birth, but prior to the age at which a reliable classification is possible. Coupling F₂ and F₃ generations and single backcrosses involving *l* and *p*, and a repulsion F₂ generation involving *l* and *a* leads to a localization of the lethal 3.8 units to the left of albinism.—H. Grüneberg.

14371. IRWIN, M. R. A genetic analysis of species differences in Columbidae. *Genetics* 24(5): 709-721. 1939.—A definite segregation of cellular (antigenic) characters specific to Pearlneck, as compared with Ring dove, was observed in the progeny of backcrosses to Ring dove of their F₁ and selected backcross hybrids. These characters are demonstrable by immunological methods. Ten of these characters were isolated in unit-form in that representatives of the respective characters, in backcrosses to Ring dove, produced a progeny of which approx. half contained the character and half did not. Three of these 10 characters are definitely associated with the "hybrid substance" of the F₁ hybrids. Evidence of a similar complexity of the specific Ring dove components is also given, following the segregation noted in the progeny of backcrosses to Pearlneck.—M. R. Irwin.

14372. MÜLLER, J. H. Vergleichende Untersuchungen über die Wirksamkeit von 200 kV Röntgen- und Gammastrahlen auf die Puppen von *Drosophila melanogaster*. I. Bestimmung des "äquivalenten Röntgenwertes" für Gammastrahlen. II. Untersuchung über die Summation von Röntgen- und Gammastrahlen. *Strahlentherapie* 64(4): 633-654. 1939.—Similar S-shaped killing curves were obtained when *Drosophila* pupae were exposed to 200 kV X-rays or to γ rays. The "equivalent" dose in roentgens for a γ ray

source was 103 r/min. per gram of radium, the effective point-source being used at the standard distance of 1 cm and filtered by 0.5 mm of Pt. By administering various doses of both X- and γ -rays to the same pupae, results showing a perfect summation of the 2 kinds of radiation were found. Hence, similar mechanisms for radiation injury were indicated. Variation in stage of development of the pupae used was under 11 hours, the cultures being 5-6 days old.—*F. M. Uber.*

14373. RUSSELL, W. LAWSON. Investigation of the physiological genetics of hair and skin color in the guinea pig by means of the dopa reaction. *Genetics* 24(5): 645-667. 1 fig. 1939.—On the assumption that the dopa reaction indicates some phase of pigment-forming activity or capacity, frozen sections of skin were treated with a buffered soln. of dopa (*L.* 3,4-dioxyphenylalanine). The reactions obtained in the basal layer of the epidermis and in 3377 hair bulbs of 93 animals representing 46 genotypes were graded under the microscope. The results obtained in the hair bulbs showed a close agreement with grades of natural yellow pigment, indicating that gene replacements at the *C* and *F* loci alter the amount of natural yellow pigment produced in the hair by affecting the concentration or activity of the enzyme system present. Apart from a threshold difference with the *C*-series, the results obtained in the basal layer of the epidermis paralleled the natural sepi pigment produced, indicating that there is a difference in the enzyme systems active in skin and hair and that gene replacements at the *C* and *P* loci alter the amount of natural sepi pigment produced in the skin by affecting the conc. or activity of the enzyme system present.—*W. L. Russell.*

14374. STRANDSKOV, HERLUF H. Inheritance of internal organ differences in guinea pigs. *Genetics* 24(5): 722-727. 1939.—The liver, lungs, heart, thyroid, kidney, adrenal, and spleen of 20 ♂ and 20 ♀ of each of 2 highly inbred strains of guinea pigs are compared as to weight, linear measurement, and general shape. The liver, lungs and heart are heavier in the heavier strain. The thyroids, the adrenals and the spleen are different in the 2 families in shape as well as in size. The results suggest that the size of internal organs may be affected by general body size factors but that they may also be affected by independent factors as well. The spleen is larger in the ♀ than in the ♂.—*H. H. Strandskov.*

MAN

14375. GARDINER, ELIZABETH M., and J. YERUSHALMY. Familial susceptibility to stillbirths and neo-

natal deaths. *Amer. Jour. Hyg.* 30(1): Sect. A. 11-31. 1939.—All the births of order two and over (53,653) that occurred in 1936 in New York State exclusive of New York City have been analyzed by mother's previous obstetrical history. The stillbirth and neonatal mortality rates of infants born to mothers who have had, previously, one or more infant losses were more than twice those of infants born to mothers who have previously had no such loss. The increase in mortality varied directly with the number of previous infant losses. It was found to be present in every order of birth and age of mother. It was more pronounced in 2d births, and in young mothers. The frequency of premature birth to mothers who had had previously an infant loss was very much higher than to mothers all of whose previous infants survived. The late fetal and neonatal mortality of full term infants showed similar disadvantages for the group who had previously had one or more infant loss. The incidence of premature birth was found to be in itself of a repetitive character; mothers who had had previously a premature birth were more likely to have a premature birth in a succeeding pregnancy than mothers whose previous births were all full term.—*Authors.*

14376. MOHR, OTTO L. Dominant acrocephalosyndactyly. *Hereditas* 25(2): 193-203. 1939.—A case of acrocephalosyndactyly in a Norwegian father and 5 of his 9 children is described. The acrocephaly is typical though not marked, the syndactyly uniformly affects the 4th and 5th finger, but the toes are unaffected. The author discusses several human genes with pleiotropic effects in relation to Goldschmidt's reaction-velocity conception.—*F. N. Briggs.*

14377. SANDERS, J. Die Erblindheit bei Totaler Farbenblindheit. *Genetica* 21: 280-284. 1939.—Total color blindness is probably inherited as simple recessive with no sex differences. New data with 20 clinical cases are given.—*E. W. Lindstrom.*

14378. THEODORE, FREDERICK H. Congenital type of endothelial dystrophy. *Arch. Ophthalm.* 21(4): 626-638. 1939.—3 cases of bilateral endothelial dystrophy or cornea guttata, occurring in a girl, her father, and her grandmother, 3 generations in all, are described. The condition in these cases is classified as of congenital origin. Most cases of the senile degenerative type occur in older people and progression is noted occasionally. In the congenital cases, the age incidence is lower and the condition is stationary. Moreover, minor anatomical differences are seen. There are at least 2 types of endothelial dystrophy, one due to senile degeneration and the other due to developmental changes.—*F. H. Theodore.*

BIOMETRY

JOHN W. GOWEN, *Editor*

(See also in this issue Entries 14321, 15551, 15790)

14379. TRELOAR, ALAN E. Elements of statistical reasoning. xii+261p. 46 fig. John Wiley and Sons, Inc.: New York, 1939. Pr. \$3.25.—This volume is a presentation of statistical methodology as a tool in scientific analysis. It presents a sequence of general concepts rather than specialized procedures. Among the general subjects treated are numerical description, the law of frequency distribution, typical values, measurement of variation, correlation,

rectilinear regression, residual variation, errors of random sampling and those of the correlation coefficient, proportions and probability, proportions of vital statistics, sampling errors of proportion, measurement of frequency discordance, and independence and bivariate tables of frequency. The 5 appendices contain tables and formulae. Advice is given on the avoidance of errors and the collection of data.—*C. A. Kofoid.*

ECOLOGY

Editors

W. C. ALLEE, *General Animal Ecology*
G. D. FULLER, *General Plant Ecology*
CHANCEY JUDAY, *Hydrobiology (Oceanography, Limnology)*

FREDERICK A. DAVIDSON, *Ecology of Wildlife Management—Aquatic*
W. L. MCATEE, *Ecology of Wildlife Management—Terrestrial*

ROBERT G. STONE, *Bioclimatology, Biometeorology*

(See also in this issue Entries: [GENERAL AND ANIMAL ECOLOGY]: Ecology of prehistoric animals, 14342; Population density, 14556; Hibernation, 14621; Bumble-bees as pollenizers, 15562; Soil nematode—soil fungus relationship, 15874; Effect of flooding on soil insects, 15900; Range of Japanese beetle, 15901; Clover midge, 15903; Meadow and pasture insects, 15904; Wood wasps and their parasites, 15926; Parasites and predators—Simulium, 15930; Cave faunas, 15942; Hydractinia on snail shells, 15982; Adaptations in eyes of whirligig beetle, 16033; Panama Canal as a passageway for fishes, 16051; Bird migration, 16082. [PLANT ECOLOGY]: Ecological significance of polyploidy, 14345; Mycorrhizal fungi, 15438, 15674; Bryophytes of Tennessee, 15479; Erosion of cultivated fields, Kansas, 15550; Soil moisture availability, 15552; Water economy of forests on sandy soil, 15626; Forests of coastal areas, of Malaya, 15636; Reforestation in Italy, 15638; Effects of forest fires, 15643; Forest of Finland, 15650; Forest succession in Switzerland, 15664; Germination of spruce and pine seed, 15667; Structure of virgin forests, 15683; Water relations of broad-leaved evergreens in winter, 15746)

GENERAL

14380. BOUYOUCOS, G. J., and A. H. MICK. A method for obtaining a continuous measurement of soil moisture under field conditions. *Science* 89(2307): 252. 1939.—The moisture content of a standardized block of CaSO_4 (gypsum) buried in the soil varies directly with that of the soil and may be measured by determining the electrical conductivity of the block by means of electrodes and a form of the Wheatstone bridge. A high degree of accuracy is reported.—*Courtesy Exp. Sta. Rec.*

14381. WELLS, B. W., and I. V. SHUNK. The important rôle of salt spray in coastal ecology. *Jour. Elisha Mitchell Sci. Soc.* 54(2): 185-186. 1938.

BIOCLIMATOLOGY, BIOMETEOROLOGY

(For further information on the effect of climatic and weather factors on organisms or processes see also, in this issue, Entries 14380, soil moisture measurement; 14395, marine temps. and plankton in East Iceland current; 14417, temp. of impounded waters, affecting fish population; 14437, incubation of game-bird eggs; 14513, blood formation in rabbits; 15101, water consumption by range cattle, Arizona; 15113, sexual development of fowls; 15114, high temp. affecting blood Ca of hens; 15310, epidemiology of influenza; 15442, light wave-lengths and exposures affecting growth of mold; 15550, rainfall affecting soil organic matter, Kansas; 15586, humidity affecting vitality of seeds; 15599, effects of heating orange groves; 15600, frost protection by flowers, citrus orchards; 15626, water availability and regeneration of pine forests; 15667, germination of spruce and pine seed; 15676, rainfall affecting forest increment; 15703, humidity-control chamber for auxin tests; 15741, temp. affecting photoperiodism, spinach; 15754, effects of ultra-violet on plants; 15771, freezing injury to wheat; 15772, seasonal sugar variations, alfalfa; 15800, conditions for mass multiplication of phytopathogenic fungus; 15891, temp. affecting tobacco mildew; 15901, future distr. of Japanese beetle in N. America; 15903, clover midge abundance; 15906, winter temps. affecting May beetle larvae; 15924, temp. and humidity affecting zoophilism of Anopheles; 15928, cold- and dryness survival of grasshopper eggs and parasites; 15936, cellar wintering of honeybees; 15959, seasonal variation in reproduction of intestinal parasite of rat; 16093, weather affecting bird flights; 16094, seasonal habits of tree sparrow, Japan. See also in issue 7(September), Entries 10743, diabetes mellitus; 10772, animals and environment; 10789, maqui vegetation; 10782, range of plant communities; 10808, spawning of oysters; 10820, winter behavior of deer, Wisconsin; 10832, marine animals; 10833, skin permeability (man); 10895, respiratory power of asphyctic blood; 10903, metabolism (rat) in reduced barometric pressure; 10914, blood hemoglobin; 10933, blood composition in mountains; 10939, lymphocytes in fever; 10940, blood changes in mountain climb-

ing; 10990, ultra-violet affecting Ca and P metabolism; 11042, 11044, pulmonary ventilation in atmospheres containing rare gases; 11045, respiration, book; 11083, color changes in animals; 11085, regulation of basal metabolism; 11120, rhythms in animals; 11121, heat affecting heart action (frog); 11129, stimulation of retina; 11126, brightness threshold of dark-adapted eye; 11128, light responses, earthworm; 11134, illumination affecting metabolism during reading; 11179, pressor effect of inhaled CO_2 ; 11197, thermal reflex vasodilatation; 11242, salt affecting resistance to histamine; 11262, effect of SO_2 (animals); 11290, ultraviolet affecting cholesterol content of tissues; 11305, hypoglycemia in anxiety and degenerative diseases; 11306, multiple sclerosis; 11329, blood coagulation time; 11342, insolation in epidemic dropsy, India; 11357, 11358, 11364, 11367, 11370, 11371, 11372, industrial diseases and atmospheric poisons; 11471, energy metabolism in goat; 11489, animal production in Turkey; 11492, desiccation effects, meat; 11504, illumination of poultry houses, effects; 11509, diurnal sequence in egg formation, poultry; 11541, allergy; 11547, epidemiology of common cold; 11681, temp.-sensitivity of polyarthritides organisms (of rat); 11682, tuberculosis mortality, Mass. and Mich.; 11692, air-borne contagion; 11698, cholera in Russia, 1830-1872; 11700, venereal disease; 11701, U-v. air sanitation; 11711, climate and spread of disease; 11715, tuberculosis in tropics and subtropics; 11938, potato yields, Ohio; 11942, pastures; 11964, black soil pigment; 11992, shape of beet root; 11995, transplanting fruit trees; 12012, climatic requirements of native and exotic trees, Austria; 12014, of exotic trees, Netherlands; 12055, cultivation of Ephedra; 12062, water balance of tropical orchids; 12080, 12081, photoperiodism; 12087, photosynthesis and light quality and intensity; 12088, gaseous exchange, lichens; 12090, rel. humidity and stomatal transpiration; 12092, water relations of grasses; 12097, seasonal effects on respiration of tomatoes in greenhouse; 12205, hurricane (Sept., 1938) effects on shade trees, New England; 12210, Malaria in Bahrein Is.; 12270, in Panama; 12261, climate affecting incidence of liver fluke (Fasciola); 12314, mollusks in ice, North Sea; 12396, temp. and butterfly emergence; 12408, caddis fly)

14385. EREDIA, F. La meteorologia e l'aerologia degli oceani. 1. L'Oceano Atlantico Sud. 2. L'Oceano Atlantico Nord. *Rivista Marittima Suppl.* 176p. 1932. 300p. 1935. Publ. by the Ministero della Marina, Rome, Italy.—The author has put into a readable well-organized form an extensive summary of the literature on the meteorology of the Atlantic, especially those elements of interest to aviation. The point of view is climatological, however, and little discussion is devoted to individual storm analysis and forecasting. Nevertheless, the meteorologist, climatologist, or ecologist, could hardly obtain a better background of what to expect as the normal conditions than by a perusal

of this work. As much space is devoted to the coasts as to the water areas proper, perhaps necessarily since data of some kinds are so meagre from the oceans. As a bibliographic survey these books are very helpful, too, though some important source materials are occasionally overlooked.—R. G. Stone.

14386. HACKBART, W. Der Einfluss kurzfristig wirkender Temperaturen auf die Entwicklung und Fortpflanzung von Schadinsekten. *Zeitschr. Morph. u. Ökol. Tiere* 35(3): 469-534. 11 fig. 1939.—The Brazilian bean beetle (*Zabrotes subfasciatus*) is stenothermous, developing normally from 22-31°C, optimum at 27°C; above or below these temps. mortality is high, chiefly because of failure of young imagoes to escape from the beans. At 35°, only 1 generation can be reared on this account, and because of failure of ♀♀ to lay eggs. When eggs were placed at 19°C, only a few ♀♀ emerged and almost no ♂♂. The mortality of young larvae placed at 40°C was 80% in 18 hrs., 100% in 72 hrs.; at 10°C, 80-90% died in 6 days. Most pupae survive 40, 10 and 0°C for 4 days or more but longer exposures result in high mortality. The young imagoes are more susceptible to the extremes, giving 97% mortality in 4 days at 40°, 12 days at 0°. Exposures of 1st instar larvae to 40° for periods varying from 24-144 hrs., retard the entire develop., the more so the longer the exposure, resulting in later and later hatching of pupae. Similar short exposures to 10° yield similar results. Exposure of pupae to 40° or 10° for varying short periods also delays the emergence of the imagoes. Exposure of embryos or larvae to temp. extremes does not affect the fertility (number of eggs laid) of ♀♀ coming from such treated stages, but ♀♀ from treated pupae show a diminished fertility. Exposure of ♀♀ to 40° for 8-120 hrs. results in diminishing fertility; treatment of ♂♂ alone has little effect. Treatment of ♀♀ on either the 1st or 2d day of their life with 40° for 24 hrs. does not affect the number of eggs laid but does diminish their viability. If the treatment is extended to 48 hrs., those exposed during the 1st 2 days of life lay few eggs of poor hatchability but thereafter can lay good eggs, whereas when exposed during the 3d-4th days of life, the eggs laid thereafter do not hatch. Fertilized ♀♀ do not survive as long as virgins; the life of ♂♂ is about equally long whether they are sexually active or not. Exposure to 40°C shortens the life of ♂♂, according to the length of exposure but may lengthen the life of ♀♀ through reducing the number of eggs laid. Exposure to 0°C may lengthen the life of some ♂♂, those thereby rendered sexually inactive; in ♀♀ it lengthens the preovipository period but does not affect period of egg-laying or length of postovipository life. Temp. conditions thus affect the 2 sexes differently. The effect of a harmful factor may be graphically expressed by plotting the % of eggs laid (max. being taken as 100%) on the ordinate and the survivors in % on the abscissa. The angle of the curve with the abscissa ("Keilwinkel") permits comparisons between different investigations.—L. H. Hyman.

14387. JUSATZ-GOTHA, H. J. Über das rythmische Auftreten von Grippepidemien und die Möglichkeit einer epidemiologischen Prognose. *Zeitschr. Hyg. u. Infektionskrankh.* 121(3): 185-207. 1938.—A critical review of the claims for and against a periodic recurrence of influenza epidemics leads the author to conclude that there is as yet no trustworthy evidence that such recurrences are correlated in any way with the allegedly rhythmical terrestrial or extraterrestrial phenomena such as periods of maximum or minimum precipitation, temps., wind velocities, solar activity or sun spots. Forecasts must be limited to recurrences within an epidemic. A reliable basis for more distant forecasts can come only when exact statistical data on morbidity and mortality have been accumulated for long periods of time.—H. J. Sears.

14388. LASSETTER, R. The value of tree-ring analysis in engineering. *Tree-Ring Bull.* 5(2): 13-15. 1938.—The author reports briefly on several studies in northeastern Tennessee as showing the value of the tree-ring technic as an aid in hydrological problems, viz., adaptation of the technic to tree growth in the area, determination of the degree of relationship between tree growth and hydrological phenomena, when a suitable relation exists to compute the approx. precipitation and run-off from tree growth values as far back as the growth curve extends, and if

possible to learn something of climatic trends in the area. The relationships derived from tree growth appear to be satisfactory enough to be of value in approximating past hydrological conditions.—*Courtesy Exp. Sta. Rec.*

14389. MÜLLER, KARL M. Untersuchungen über die Ursachen des Blitzzeinschlages in der freien Natur, insbesondere über die Blitzfrage im Walde. *Centralbl. ges. Forstwesen* 64(11): 287-300; (12): 316-335. 5 fig. 1938.—This paper discusses the problem of the relation between conditions in the outer layers of the earth's crust and the incidence of lightning strikes. The works of various investigators are reviewed, including von Pohl, Lehmann, Wehrhahn, and Bogojavlensky. Their results seem to confirm the thesis that there is a relation between lightning strikes and subterranean radiation. Lehmann found that the poles of a high tension power line that were struck most frequently were those standing over or close to intersections (at different levels) of subterranean streams of water (as revealed by divining rods and by electrometers). The electric conductivity of the air over such streams was greater than elsewhere. Wehrhahn's studies showed that, contrary to popular belief, any sp. of tree may be struck by lightning, although some, such as oak and poplar, appear to be more susceptible than others and beech, birch, and alder less susceptible. The author's own investigation showed that trees hit by lightning generally stand over intersections of subterranean veins of water. Certain spp. (oaks and willows) thrive only under the influence of earth rays from such water veins; others (beech, conifers) cannot grow in such spots. Location of the veins may shift as a result of earthquakes, which explains the presence of conifers in places where they are struck by lightning. Lightning fires in the forests of N. W. No. America are closely correlated with shifts in subterranean water, and consequently with the incidence of earth rays, which both cause trees to be attacked by insects and fungi and draw lightning. Certain birds instinctively avoid nesting in places exposed to earth rays and hence to lightning; swallows and storks are mentioned.—W. N. Sparhawk.

14390. NORBURN, MARTHA ELIZABETH. Climate of the Carolina highlands. *Jour. Elisha Mitchell Sci. Soc.* 54(2): 189. 1938.

14391. VILLARET, BERNARD. Climatologie médicale des Établissements français d'Océanie. 48p. Paris, 1938.—After a collection of climatological information drawn from good authority, the author launches an instructive chapter concerning the influence of the climate on the demography, hygiene and living conditions in the French settlements of the South Sea Islands. The effect of the humidity, of the air, and of the sun, of the rainfall, of the temp., etc., on the propagation of certain diseases, notably elephantiasis and leprosy, affords an interest of the first order. A discussion of the influence of the climate on Europeans terminates the volume.—R. G. Stone.

ANIMAL

14392. CASPERS, H. Histologische Untersuchungen über die Symbiose zwischen Aktinien und Korallenfischen. *Zool. Anz.* 126(9/10): 245-253. 6 fig. 1939.—Why fish symbionts of actinians are not stung by the anemone has never been explained. In a study of the association of coral fishes (*Amphiprion percula*) and tropical anemones (*Stoichactis*), the fish skin and the anemone tentacles were examined histologically. The fish skin failed to show any characteristics which might protect it against nematocysts. The tentacles of the anemone do not, however, contain any nematocysts proper, being provided only with spirocysts. The function of spirocysts is not understood, since they have never been seen to discharge, but it is certain that they have no toxic action; hence *Stoichactis* is incapable of injuring its commensal fish. It probably catches food by the adhesive action of the numerous gland cells in the tentacles.—L. H. Hyman.

PLANT

14393. GLOVER, J. The root-system of *Agave sisalana* in certain East African soils. *Empire Jour. Exp. Agric.* 7(25): 11-20. 12 fig. 1939.—The "water method" described by Nutman (*Empire J. Expt. Agric.*, 1933), was used for determining the root-systems. The root-system of an aver-

age 5-yr.-old plant has a radius of at least 10 ft. and a depth of 40 in. The physical nature of the soil and especially its water-retaining capacity can profoundly modify the root-distribution, but within wide limits the pH of the soil apparently does not. Production of the flowering shoot is followed by progressive degeneration of the feeder-roots. Weed roots occupy the same layers of soil as those of the sisal, and the resulting competition is especially severe in areas liable to a deficiency of soil moisture.—*J. Glover.*

14394. STEUSLOFF, U. Zusammenhänge zwischen Boden, Chemismus des Wassers und Phanerogamenflora in fließenden Gewässern der Lüneburger Heide um Celle und Ulzen. (Nebst Untersuchungen über die Perlmuschel in diesen Gewässern.) *Arch. Hydrobiol.* 35(1): 70-106. 1 pl., 4 fig. 1939.—Analysis of the phanerogam flora of certain slowly flowing streams in the Lüneburg Heath (Hanover) shows the existence of several associations, the occurrence of which is correlated with temp. and the dissolved materials in the water (particularly nitrate, phosphate, chloride) and hardness. Such plants as *Scirpus fluitans*, *Juncus supinus*, *Potamogeton polygonifolius*, *Montia rivularis*, *P. rufescens*, *Callitriche hamulata*, and *Myriophyllum alterniflorum* are practically confined to the cooler, soft-water, low-nutrient upper reaches, while a large group, including *P. natans*, *P. crispus*, *P. perfoliatus*, *P. lucens*, *Callitriche stagnalis*, *Sagittaria sagittifolia*, *Myriophyllum spicatum*, *Butomus umbellatus*, *Acorus calamus*, and *Scirpus lacustris* occurs only in the broad, warm lower reaches, rich in dissolved nutrients. Another group of plants, indifferent as to choice of habitat within the region, was also noted. The temp. requirements of the several important indicator species are discussed, and the several associations distinguished are referred to the standard associations of the German plant-sociologists. Notes on the biology of the pearl mussel, *Margaritana margaritifera*, are appended. This mussel is found in two of the streams investigated, in the reaches characterized by *Myriophyllum alterniflorum*. Data on dimensions and weight of the shell are given; the very slow growth is attributed to Ca deficiency in the waters favored by the species. The zoogeography of the mussel in Europe is discussed; it is confined to Ca-poor regions within the borders of the maximum (Riss) glaciation. The occurrence in the Lüneburg Heath, outside the border of the last (Würm) glaciation, is not regarded as a case of interglacial relict distribution but is more probably to be attributed to migration from Scandinavia during Ancyclus time.—*E. S. Deevey.*

OCEANOGRAPHY

(See also in this issue Entry 16015)

14395. MESCHKAT, A. Untersuchung über das Herbstplankton im Bereich des "Ostislandstromes." *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(3/4): 285-352. 30 fig. 1939.—During Oct. and Nov., 1935, 4 profiles were made in the region between eastern Iceland and Jan Mayen Land by the "Meteor"; oceanographic details have not yet been published, but preliminary results were available to the author, who deals primarily with the surface plankton. A tongue of cold water of low salinity, a branch of the east Greenland current, extends through the region from the northwest to meet the warm, saline waters of the Gulf Stream, one branch of which encircles Iceland in a clockwise direction to form the Irminger current. The isohaline of 34.8‰ is taken as demarcating the "subarctic" from the "Atlantic" water mass; in addition to the main tongue of subarctic water, two small tongues extend into the area in the vicinity of Jan Mayen Land. The relation of plankton to hydrography is examined by the method of cartographic correlation. Figures for total Protista are compared with these for phosphate, and a rough negative correlation is found, the Atlantic water being richer in plankton and poorer in phosphate than the subarctic. The hydrographic differentiation of plankton, however, is not striking until the several components are analyzed separately. When the difference: log Protophyta—log Protozoa, is plotted, the subarctic water is found to be characterized by consistent negative values, the Atlantic by positive, except for a relatively small area occupied by the maximum

density of Metazoa, in which an anomalous excess of Protophyta is attributed to removal of the smaller animals by the larger. When the distribution of individual plankters is considered, a number of forms are observed to characterize, with varying degrees of completeness, the water masses distinguished. Especially characteristic in the intensity of its distribution in the subarctic water is the tintinnid *Ptychocylis obtusa*, while the few occurrences of the diatom genus *Achnanthes* are likewise closely restricted to the colder water mass. Of the forms found to be essentially diagnostic of Atlantic water, the plotted distributions of the Peridinians *Ceratium longipes*, *C. horridum*, and *C. tripos*, the diatom *Nitzschia seriala*, and the radiolarian *Protocystis tridens*, are particularly striking. Two examples of forms restricted to coastal waters are given in the diatoms (*Skeletonema costatum* and the chain-forming *Thalassiosira* species). As an example of biocoenotic influences on the distribution of plankters the occurrences of the tintinnids *Ptychocylis obtusa* and *P. urnula* are analyzed. Although *P. obtusa* characterizes subarctic water, *P. urnula* Atlantic, both species occur together in the zone of mixture, in densities not obviously correlated with hydrography. When it is realized that the volumes of the two species are approx. in the ratio *urnula:obtusum* = 125:64, and the differences between the logarithms of the individual numbers are plotted, the line for the difference log 64 minus log 125, marking the line of equal mass per unit volume of water, separates the two species, and is found to coincide with the isotherm 6.5° C. A number of forms are found whose distribution is not explicable on hydrographic or other grounds, notably among the Metazoa. In conclusion, it is pointed out that many anomalies in distribution of plankters are intelligible only on the basis of mixture of the water masses, and that with the availability of estimates of abundance throughout a given region and the exercise of careful judgment, certain forms can be used as biological indicators of such hydrographic admixture. A synthetic, summary map of the region under consideration is presented, based on the distributions analyzed, which indicates considerable lateral mixing, and is said fully to substantiate the hitherto unpublished conclusions of the other members of the oceanographic expedition.—*E. S. Deevey.*

14396. NIELSEN, E. STEEMAN. Über die vertikale Verbreitung der Phytoplanktonen im Meere. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(5/6): 421-440. 1 fig. 1939.—In discussing the vertical distribution of marine phytoplankton the author examines the question of the existence of "light" and "shade" species, relying on his investigation of the plankton of the "Dana" collections. In nearly all northern oceans the hydrography is such that differentiation of species of different light requirements is impossible; but in the tropics, where thermoclines lie deeper and light penetration is greater, such differentiation can occur, and is particularly striking in the case of the species of *Ceratium*. Series of plankton hauls made with the closing net in the Indian and eastern Asiatic oceans permit division of the *Ceratium* species into oligophotic, mesophotic, and euphotic forms. The mesophotic forms are those found deeper in plankton-poor (highly transparent) stations, shallower at plankton-rich or detritus-rich stations. A reply is made to the objections raised by Schubert against the author's published views on this subject. No evidence of vertical migration of *Ceratium* was found by the "Dana."—*E. S. Deevey.*

14397. WHEDON, W. F. A three year survey of the phytoplankton in the region of San Francisco, California. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(5/6): 459-476. 2 fig. 1939.—As part of an investigation of poisoning by the mussel *Mytilus californianus*, surface plankton samples were collected from a pier in San Francisco at frequent intervals. No evidence of correlation between temp. variations and numbers of either dinoflagellates or diatoms could be found, but the number of species recorded was observed to parallel the seasonal change of water temp. The major pulse of diatoms occurred during the 2d quarter of each year, while the dinoflagellate maximum was recorded during the 3d quarter, except in 1935. Diatoms greatly outnumbered dinoflagellates in nearly all samples.—*E. S. Deevey.*

LIMNOLOGY

(See also in this issue Entries 14394, 14411, 14416, 14422, 14553, 15333)

14398. IVLEV, V. S. Transformation of energy by aquatic animals. Coefficient of energy consumption by *Tubifex tubifex* (Oligochaeta). *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(5/6): 449-458. 1 fig. 1939.—The "coefficient of energy consumption" is defined as the ratio of the quantity of energy accumulated in the body of an organism to the total quantity of energy consumed during the same time. In order to evaluate this coefficient for *Tubifex*, a series of expts. was performed in which the increase in calorific value of animal material was determined from the increase in weight; the animals were fed on organic silt containing about 1% platinum black per unit of dry weight, the excrements were collected, and the calorific capacity of the silt passed through the intestine was detd. from the Pt content. On an average 50.37% of the energy in the silt was absorbed. The mean value of the coefficient of energy consumption was 31.59%. This value is compared with other determinations for fish (17-35%) and *Aspergillus* (20-58%, depending on the medium). The coefficient is shown to differ with differing environmental conditions and with the age of the organism, while the taxonomic position of the organism is believed to have little effect.—E. S. Deevey.

14399. LACKEY, JAMES B. Aquatic life in waters polluted by acid mine waste. *Publ. Health Repts.* 54(18): 740-746. 4 fig. 1939.—Acid coal mine streams and strip pits were biologically surveyed in early spring and late summer. While supporting a dense population, waters in the acid range pH 1.8 to pH 3.9 showed only 99 spp., 18 of which were common. *Typha latifolia* was the dominant higher plant, the remaining 17 spp. being Algae, Protozoa and Trochelmithes. *Euglena mutabilis* occurred in 88.57% of all samples.—J. B. Lackey.

14400. NÖTHLICH, K. Der jahreszeitliche Gang der physikalisch-chemischen Eigenschaften der Havel und Spree unterhalb von Berlin in den Jahren 1934 und 1935. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(3/4): 212-230. 7 fig. 1939.—Frequent, often daily observations at several stations distributed throughout a 17 km. reach of the Spree below Berlin from May 1934 to July 1935, permitted analysis of variations in temp., dissolved O₂, O₂-consumption, free CO₂, bicarbonate, carbonate, pH, chloride, and phosphate. In order to evaluate the influence of municipal pollution, data for 3 divisions of the reach are presented separately. Cultural influences are particularly apparent in the figures for dissolved O₂ and O₂-consumed. Variations in free CO₂ are closely related to those for O₂; variations in bicarbonate, carbonate, chloride, and phosphate are primarily due to fluctuations of water-level. The effect of the latter factor on pH is masked by the buffering action of the dissolved materials. Data are appended for the Wannsee, a backwater of the Spree, which indicate a considerable thermal and O₂ stratification, particularly in summer.—E. S. Deevey.

14401. STEINWENDER, J. Das Plankton in den Teichen der Striegauer Steinbrüche. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(5/6): 401-420. 2 fig. 1939.—Investigation of the plankton of 5 ponds in abandoned granite quarries in Silesia indicates a general poverty of biota, attributable to extreme deficiency of dissolved materials. Littoral vegetation is almost or entirely absent on the steep walls; transparency is in general high. The quarries examined can be divided into two groups, the unmodified or oligotrophic group, and the eutrophic group, characterized by contamination by poultry excrement. That such waters acquire plankton very rapidly is indicated by observations in one quarry, abandoned in 1933, in which representatives of all major groups found in other quarries (Copepods, Cladocera, Rotifers, Peridiniids, Chlorophyceae, Cyanophyceae, Diatoms) were present at the end of 67 days.—E. S. Deevey.

14402. VOLTERRA d'ANCONA, L. Un nuovo periodo di ricerche sulle Dafnie di Nemi (1930-1935). [A new period of research on the *Daphnia* of Lake Nemi.] *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 37(6): 571-603. 1 pl. 1938.—The lake contained originally a race of *D. longispina*; *D. cucullata* was established in the lake by Woltereck in 1914 from ephippia obtained from Frederiksborg in Denmark.

The cyclomorphosis of the two forms has been studied in earlier years. In 1928 began a lowering of the level of the lake for archaeological researches; this was continued until 1932 when the lake lay 21.4 m. below the original water level. Subsequently the lake has filled up slowly; in 1935 it was 15.7 m. below the original level. In 1930 plankton became abnormally abundant, both species of *Daphnia* were present in increased numbers, grew rapidly and exhibited much sexual reproduction. *D. cucullata* remained unchanged, but in Oct. 1931 a well marked round-headed form of *D. longispina*, which had shown no morphological change since the earliest known samples (1897), appeared. Various abnormal forms interpreted as due to depression, as the result of overcrowding, were also observed. In 1932 *D. cucullata* disappeared, and *D. longispina* became rare, finally disappearing after the time of minimum level. No *Daphnia* could be obtained in 1933. *D. longispina* reappeared in April 1934. Both species were common in July of that year, represented by conspicuously smaller forms than previously present. After a short reappearance, *D. longispina* disappeared and apart from a few doubtful forms, only *D. cucullata* occurred in April. By the end of 1935 the whole population consisted of undoubted specimens of a small form of the latter species. The possibility of hybridization producing the small number of doubtful forms is discussed; if such hybridization occurred it has had no general effect on the present population.—G. E. Hutchinson.

14403. WERNER, B. Über ein neues, automatisch schliessendes Bodennetz. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(3/4): 368-371. 3 fig. 1939.

14404. YOSHIMURA, S. Stratification of dissolved oxygen in a lake during the summer stagnation period. *Internat. Rev. ges. Hydrobiol. u. Hydrogr.* 38(5/6): 441-448. 3 fig. 1939.—Preliminary analysis of the oxygen data for 208 Japanese lakes indicates that metalimnetic maxima are much more frequent in Japan than in most other lake districts investigated. Assuming the compensation level to correspond to 1.2 times the mean summer transparency as measured with a Secchi disc, as appears justifiable, the frequency of metalimnetic maxima can be attributed to the fact that epilimnia are thinner in Japan than in the Baltic region, for example. Due to the relatively slight wind-induced turbulence, compensation levels tend to lie below the zone of turbulent mixing, and the oxygen maxima produced are not subsequently destroyed. Shallow Japanese lakes tend to lack the metalimnetic oxygen maximum, not because they are less transparent or more thoroughly disturbed by winds, but due to the gradual diffusion upward throughout the summer of a microzone nearly devoid of oxygen.—E. S. Deevey.

WILDLIFE MANAGEMENT—AQUATIC

(See also in the section "Pisces"; and Entries 14397, 15086, 15322, 15333, 15361, 15375, 15385, 15391, 15686, 15948, 16019, 16051)

14405. BANGHAM, R. V., and N. L. BENNINGTON. Movement of fish in streams. *Trans. Amer. Fish. Soc.* 68: 256-262. 1938(1939).—This report is a continuation of a study conducted during the spring and summer of 1936 and includes, in addition to the area covered in the earlier investigation, two other portions of stream each 1 mile in length. As in 1936 the larger fish were tagged, measured and then released. From June 15 to Sept. 17, 1937, 11.7% of 487 tagged fish were recaptured. No fish tagged the previous year were caught. Native stream fish seem to be acclimated to their habitat and do not move as far as introduced fish. No marked fish were taken except near the station where the tagging was done. The data for distribution of species show considerable variation in the species composition of the fish population of a given area from week to week.—Authors.

14406. BIERRY, R., et B. GOUZON. Les huitres de consommation. A travers les âges, Biologie, Élevage et production, Valeur alimentaire, Salubrité. In: *Actualités Scientifiques et Industrielles*. 136p. 8 fig. J. B. Baillière et Fils: Paris, 1939. Pr. 25fr.—This booklet is designed for lovers of the savory oyster who desire knowledge of its curious life and its nutritive and therapeutic values. It is a comprehensive summary of the history of ostreiculture and

culinary use of oysters from prehistoric and classic times to the present. The anatomy of the adult and larval stages, development, breeding seasons, relations of seasonal and environmental conditions to reproduction, enemies and diseases of the two main European species, *Ostrea edulis* and *Gryphea angulata*, are reviewed. Cultural methods, including collection of spat, growing, fattening, greening, and conditioning for shipment as practiced in the oyster parks of France are outlined. The stabulation or autopurification of contaminated oysters as developed under sanitary direction is described. A map showing the prevalence of typhoid fever in districts of oyster production is given. Biochemical analyses of oysters are reported showing the content of iodine and various rare minerals and of vitamins A and D, and the low caloric value.—C. A. Kofoed.

14407. DAVIS, H. S. Objectives in trout stream management. *Trans. Amer. Fish. Soc.* 68: 76-81. 1938(1939).—The primary purpose of trout stream management must be to provide sport and recreation for as many persons as possible. In heavily fished streams the object should be to provide numbers of medium sized trout rather than a few large fish. Artificial stocking with small trout has been a failure in many instances; stocking with legal fish shortly before or during the open season has been more successful. Failures in artificial stocking are due largely to planting fish in unsuitable waters.—H. S. Davis.

14408. ESCHMEYER, R. WILLIAM. Summary of a four year creel census on Fife Lake, Michigan. *Trans. Amer. Fish. Soc.* 68: 354-358. 1938(1939).—A creel census was taken on Fife Lake, a 739-acre Michigan lake, for 4 successive fishing seasons, 1934 to 1937 inclusive, shows constant decline in the catch of some species and a corresponding increase in the catch of others. The total take remained relatively constant from year to year; an increase of 92% in fishing effort resulted in an increase in the take of only 16%. Increase in fishing was apparently more closely associated with a decrease in the catch per fishing hour than with an increase in the total catch. Some correlation was found between the percentage of larger piscivorous fish and the size of pan fish in the catch.—R. W. Eschmeyer.

14409. FREY, DAVID G., HUBERT PEDRACINE, and LAWRENCE VIKE. Results of a summer creel census of lakes Waubesa and Kegonsa, Wisconsin. *Jour. Wildlife Management* 3(3): 243-254. 1939.—Both lakes are strongly eutrophic. Water flows from Waubesa into Kegonsa through 4 miles of river. Information was obtained by having the boat livery operators and fishermen fill out census cards, and from the data obtained, careful estimates were made of the total fishing in each lake. Waubesa of 2,034 acres yielded 75,000 fishes from May 15 to October 15, 1938; Kegonsa of 3,145 acres yielded 45,000 fishes. 80% of the Waubesa catch was black crappies; 50% of the Kegonsa catch was white bass. Waubesa yielded 1.86 fish and Kegonsa 1.24 fish per fishing hour. Marked differences were observed in catch composition compared with fish censuses of previous years, in which blue gills were dominant. There was no correlation between numbers of fish stocked and numbers caught. More than 2 million pounds of carp were removed from Waubesa during 1938.—D. G. Frey.

14410. HAZZARD, ALBERT S., and DAVID S. SHETTER. Results from experimental plantings of legal-sized brook trout (*Salvelinus fontinalis*) and rainbow trout (*Salmo irideus*). *Trans. Amer. Fish. Soc.* 68: 196-208. 5 fig. 1938(1939).—Intensive creel census during the 1937 trout season in conjunction with monthly releases of 3,000 legal-sized trout, over $\frac{1}{2}$ of which were marked, furnished data for the evaluation of such plantings in the Pine River, Michigan. Nearly 8,500 hrs. of fishing yielded 3,171 brook trout and 3,333 rainbow trout, an average catch of 0.77 fish per hr. 46% of the brook trout and 21% of the rainbow trout originated from the hatchery plantings. Incomplete records of the marked fish showed recovery of 19.8% of 7,513 brook trout planted and 17.5% of 4,007 rainbow trout released. The plantings influenced the catch for only 2-3 weeks. Every planting during the open season caused a rise in the catch of wild fish of the same species. Planting large numbers of legal fish increases the catch temporarily and artificially, but such plantings may deplete a stream of wild adults, which would affect natural reproduction adversely in succeeding years.—D. S. Shetter.

14411. HUBBS, CARL L., and R. W. ESCHMEYER. The improvement of lakes for fishing. A method of fish management. *Bull. Inst. Fish. Res. [Michigan]* 2. 1-223. Illus. 1938.—This is a practical study of ways and means of conserving, increasing, and exercising more of a scientific control of the production of game and food fishes in lakes. It is largely directed toward the increase of vegetation, rock and brush shelters, and other forms of shelters favoring the multiplication of water insects and minnows and attractive environments for spawning and protection of fry. Erosion, pollution, wave action, oxygen deficiency, winter-kill, algal nuisances, control of migrations of fishes, elimination of competitors, predators, and excess of coarse fish, and depletion are among the topics discussed. Little attention is given to manuring and other means of increasing true plankton production, the main basis of productivity of lakes. This is a pioneer study of basic problems in the recovery and preservation of important features in our natural resources of both food and sport. It has an extensive annotated bibliography, full index, and abundant illustrations of many practical details.—C. A. Kofoed.

14412. KING, WILLIS. A program for the management of fish resources in Great Smoky Mountains National Park. *Trans. Amer. Fish. Soc.* 68: 86-95. 1938(1939).—The streams in Great Smoky Mountains National Park are one of its most attractive natural features. Fish resources are managed in an effort to provide the best fishing compatible with the preservation of native stream fauna. Smallmouth bass occupy the lower portions of the streams along the borders of the park, usually below 1,600 feet in elevation. Brook trout occupy the headwaters, occurring as low as 3,000 ft. in a few instances. The rainbow trout, an introduced species, occupies the band between the first 2 spp. mentioned, slightly overlapping their distribution when no falls or cascades intervene. Native species (smallmouth bass and brook trout) are stocked in waters which they are able to occupy, and rainbow are used to fill in the gaps. 300,000 fingerling trout, including both rainbow and brook trout, and averaging 4 to 6 inches in length, are planted annually during Sept. and Oct. The fry are obtained from the U. S. Bureau of Fisheries Hatchery near Smokemont, N. Carolina, and are reared in 35 standard-type concrete rearing pools, part of which are operated in connection with the hatchery and part by the National Park Service at the Chimney's Camp Ground on the Tennessee side of the Park. The fishing season extends from May 16 to Aug. 31. Fishing is permitted between 5 A. M. and 6:30 P. M. Central Standard Time, and with artificial lures bearing only one hook. A limit of 10 fish of one or all spp. may be taken, of rainbow 8 in. in length or over, of brook trout and rock bass 6 in. or over, of smallmouth bass 10 in. or over. The season on the last 2 spp. opens June 16 and ends Aug. 31. The protection and preservation of native stream fauna is considered paramount in the management program.—W. King.

14413. LAGLER, KARL F. The control of fish predators at hatcheries and rearing stations. *Jour. Wildlife Management* 3(3): 169-179. 1939.—In 1937, 15,223 reptiles, birds, and mammals were killed at 228 fish hatcheries in 38 states according to figures based on returns from a nation-wide poll. Of the several control methods reported, screening and wiring of ponds and raceways and shooting and trapping of predators afforded the greatest protection. Wider use of controls that do not involve the wholesale destruction of actual or supposed predators is recommended.—K. F. Lagler.

14414. LEONARD, JUSTIN W. Feeding habits of the Montana grayling (*Thymallus montanus* Milner) in Ford Lake, Michigan. *Trans. Amer. Fish. Soc.* 68: 188-195. 1938(1939).—A sample of 50 grayling averaging 89 mm. in standard length was collected on May 18, 1937. Stomach examinations showed that larvae and pupae of the Chironomidae made up 65.4% of the diet; predacious insects—nymphs of *Enallagma carunculatum* and *E. hageni* together with adult dytiscid beetles (*Bidessus* sp.), accounted for 28.1%. 32 grayling averaging 162.5 mm. in standard length were collected from Oct. 18 to 20, 1937. In their diet Odonata nymphs accounted for 25.3% while immature chironomids dropped to 8.5%. The unusual occurrence of large amounts of predacious insects raises anew the question

of selectivity vs. availability in fish feeding habits.—J. W. Leonard.

14415. LUCAS, CLARENCE R. Game fish management. *Trans. Amer. Fish. Soc.* 68: 67-74. 1938(1939).—Present freshwater game fish work in the U. S. includes all the elements necessary to management. These elements are not well coordinated, however. This lack of coordination renders the work partially ineffective. The several objectives of today's operations are giving haphazard results which we should recognize as subject to betterment. Scientific surveys, censuses, and studies, hatchery work, regulations, stream improvement, and other fish conservation activities should be developed in a coordinated program based upon a single purpose, the increase of satisfactory fishing. To accomplish this balancing of activities, the use of coordinators, or fish managers, is recommended.—C. R. Lucas.

14416. MOTTLEY, C. McC., H. J. RAYNER, and J. H. RAINWATER. The determination of the food grade of streams. *Trans. Amer. Fish. Soc.* 68: 336-343. 1938(1939).—The volume and number of organisms per unit area of bottom is widely used in determining the relative richness or food grade of streams. The food grade is an important factor in the calculations used to determine the number of fish to plant per mile of stream. Although the food grade is so important and inaccurate determinations may lead to wasteful practices, no one seems to have investigated the fundamental problems involved. The paper outlines these problems and presents data to show that there is a considerable variation in the food grade as determined by a number of workers studying one stream at the same time and that high water may completely alter the picture.—C. M. Mottley.

14417. SENNING, WILLIAM C. The chemistry of impounded waters as a factor in game fish production. *Trans. Amer. Fish. Soc.* 68: 303-308. 1938(1939).—Chemical conditions that directly affect fish life were investigated in a large number of small, new and old artificial lakes in New York State. Examples are cited which indicate that chemical conditions tend, at first, to be unsuitable for game fish everywhere in the lake, and no stocking should be done. As the lakes increase in age, the surface layer of water improves sufficiently to support fish, but the deep, cold waters rarely improve enough to provide a suitable environment for cold-water species. The rate and degree of recovery depend on the volume and temp. of the water passing through the lake, on the depth of the water, and on the type of vegetation established.—W. C. Senning.

14418. SHETTER, DAVID S., and ALBERT S. HAZARD. Species composition by age groups and stability of fish populations in sections of three Michigan trout streams during the summer of 1937. *Trans. Amer. Fish. Soc.* 68: 281-302. 2 fig. 1938(1939).—Intensive studies of the fish populations in 3 sections of the South Branch of the Pine River, 2 sections of the Little Manistee River, and 3 sections of the North Branch of the Boardman River were carried out monthly from June to Sept. 1937. Identical sections in each stream were blocked and seined once monthly. The captured fish were enumerated by species, weighed, measured and fin-clipped and released alive, except in one section of each stream. Scale samples were taken from all trout above age-group 0. The efficiency of the blocking- and seining method of stream census was indicated to be between 89 and 100%. The data collected demonstrated that fish population calculations based on samples from 1 or 2 limited stream areas are inaccurate. Distribution of the trout among age groups 0 to III are presented.—D. S. Shetter.

14419. SPOOR, WILLIAM A., and CLARENCE L. SCHLOEMER. Diurnal activity of the common sucker, *Catostomus commersonnii* (Lacépède), and the rock bass, *Ambloplites rupestris* (Rafinesque), in Muskellunge Lake. *Trans. Amer. Fish. Soc.* 68: 211-220. 2 fig. 1938(1939).—Gill nets were examined at 2- to 4-hr. intervals throughout ten 24-hr. periods. The rate at which suckers were captured at depths around 6 m. was highest during the periods 3-5 a.m. and 7-9 p.m. and lowest during the periods 8 a.m. to 4 p.m. and 10 p.m. to 2 a.m. The rate of capture was high at midday at depths around 8 m. The suckers appear to move inshore in the evening and offshore in the morning.

Apparently the hourly fluctuations in the catch were caused by fluctuations in abundance in the vicinity of the nets which resulted from the inshore and offshore movements. The rock bass were captured in far greater numbers at night than in the daytime. The rate of capture was highest between 7 and 9 p.m., but remained high throughout the night. The rate increased slightly between 3 and 4 a.m. Apparently increased visibility was the chief cause of the decrease in the rate of capture during the day, but there is evidence that rock bass undergo periodic changes in activity. The results offer very little evidence of daily inshore and offshore movements.—W. A. Spoor.

14420. STOUT, J. H. A study of the migration of the wall-eyed pike (*Stizostedion vitreum*) in waters of the Chippewa National Forest, Minnesota. *Trans. Amer. Fish. Soc.* 68: 163-169. 1938(1939).—Of 2637 wall-eyed pike tagged in April 1937, 13.1% were recovered during that year. All pike were tagged with consecutively numbered jaw tags. Wall-eyed pike were mostly finished spawning by June 1. A short time after spawning most of the wall-eyed pike had left their spawning areas and distributed themselves over their summer range extensively. A complete check-up at State spawning nets in 1938 yielded only 13.1% of the total number tagged and left 74% which were unreported. The assumption that most of the wall-eyed pike tagged in 1937 sought new spawning areas in 1938 or remained in Lake Winnibigoshish to spawn may be correct but further checking and additional tagging studies are necessary.—J. H. Stout.

14421. SURBER, EUGENE W. A comparison of four eastern smallmouth bass streams. *Trans. Amer. Fish. Soc.* 68: 322-333. 1 fig. 1938(1939).—Growth studies of fingerling and larger smallmouth bass *Micropterus dolomieu* showed marked differences in 4 streams in the Potomac River watershed. In streams such as the Shenandoah River with a small bass population, fingerlings grew rapidly, but in the South Branch of the Potomac and Cacapon Rivers where bass are abundant, studies showed slow growth rates both in fingerlings and adults. In a study of the extent of natural propagation, actual counts of the number of bass nests per mile were made in 4 rivers. These counts showed several times the number of nests per mile in the streams where fishing was poorest than in streams where fishing was good. A seasonal study of the food of fry and fingerling bass was made from monthly collections of fry and fingerlings made during 1936. The chief items of food in both rivers (South Branch of Potomac and Shenandoah Rivers) were mayfly nymphs (*Baetis*) and chironomid larvae. Entomostraca (chiefly *Cyclops*) played a minor rôle as food. In the Shenandoah River, where bass grow rapidly, 9.9% of the fry averaging 10 mm. in length had consumed fish, and fish constituted one of the main items of food in fry and fingerlings of all sizes in this river. Bottom fauna studies in riffles of the 4 rivers showed interesting faunal differences. In the clear streams such insect larvae as *Eriocera*, *Atheria*, and *Chauliodes* and nymphs of *Isonychia* and *Iron* were more abundant than in the streams which remain muddy for a considerable time. In the latter streams, Sphaeriidae, Oligochaeta, larvae of *Elophila* and parnid beetles, and nymphs of *Potamanthus* were more abundant. Field studies indicate that probably few streams in the region actually require stocking with bass. Rather, forage fish should be stocked for rapid growing fish seem to be produced in streams in which the ratio of forage minnows to bass is greatest.—E. W. Surber.

14422. TARZWELL, CLARENCE M. Changing the Clinch River into a trout stream. *Trans. Amer. Fish. Soc.* 68: 228-233. 1938(1939).—The construction and operation of Norris Dam has changed the portion of the Clinch River, just below the dam, from a warm-water to a cold-water stream. Since many of the warm-water forms were killed rainbow trout were planted in 1936. In 1938 quantitative studies of the bottom organisms which were made to determine if a cold-water fauna was developing, demonstrated that only a small residual population was present and that the bottom fauna was not as yet typical of a trout stream. Trichoptera, Ephemeroptera and Odonata were almost lacking but snails constituted 97.21% of the weight of bottom organisms found. Chironomidae greatly outnumbered all other forms. If a typical trout stream does

not develop planting of such forms is recommended.—C. M. Tarzwell.

14423. VAN OOSTEN, JOHN, and HILARY J. DEASON. The age, growth and feeding habits of the whitefish, *Coregonus clupeaformis* (Mitchill) of Lake Champlain. *Trans. Amer. Fish. Soc.* 68: 152-162. 1938(1939).—Data are presented on length frequencies, age composition, growth, coefficient of condition, sex ratio and standard length-total length relationship of 120 whitefish collected in northern Lake Champlain (Missisquoi Bay) in 1930, and of 175 whitefish taken in southern Lake Champlain in 1931. Two distinct populations of whitefish exist in Lake Champlain as shown by differences in spawning grounds, rate of growth, differences in actual lengths and weights of corresponding age groups at the time of capture, and differences in the coefficient of condition and the length-weight relationship. The feeding habits were studied through a qualitative and quantitative analysis of the stomach contents of 141 whitefish from southern Lake Champlain. The food consisted of 92.8% molluscs, 6.4% insect larvae and the remainder of fish eggs, plants and inorganic debris.—Authors.

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also the section "Aves"; and Entries 14317, 14413, 15677, 15969, 15976, 16085)

14424. ALLEN, DURWARD L. Winter habits of Michigan skunks. *Jour. Wildlife Management* 3(3): 212-228. 4 pl. 1939.—In a southern Michigan study of the eastern skunk (*Mephitis m. nigra*) 143 individuals were handled by box trapping, steel trapping, and the digging of burrows. In a series of weights 33 ♂♂ averaged 1,905.1 g. and 30 ♀♀ averaged 1,411.8 g. in late winter. 36 breeding season autopsies indicated that the older ♀♀ (separated by weight) bred in late Feb. and young ♀♀ about a month later. Of 26 burrows excavated, 11 contained skunks. In each of 2 burrows one ♂ was found with 10 ♀♀. In no case was more than one ♂ present with ♀♀. Female skunks became inactive in winter earlier than ♂♂; hence trapping late in the season takes mostly ♂♂ and preserves the ♀♀ as breeders. Conversely, the digging out of winter dens will take a high percentage of ♀♀ and destroy the source of a possible new fur crop.—D. L. Allen.

14426. BOND, RICHARD M. Coyote food habits on the Lava Beds National Monument. *Jour. Wildlife Management* 3(3): 180-198. Map. 1939.—From 273 droppings and 9 stomachs taken, in all months but February, on the Lava Beds National Monument (adjacent to the Tule Lake Wildfowl Refuge), in Siskiyou and Modoc Counties, California, 706 probably non-carriion food items were identified. Of these 481 (65.18%) were mammals (19 species: Felidae 1, Sciuridae 6, Heteromyidae 2, Cricetidae 5, Erethizontidae 1, Ochotonidae 1, Leporidae 2, Cervidae 1); 26 (3.67%) were birds or bird eggs (7 spp.: Anseriformes 3, Galliformes 2, Passeriformes 2); 8 (1.08%) reptiles; 145 (19.65%) insects; and 46 (6.23%) were vegetable items. Evaluation of effects (as distinguished from activities) of the coyotes is complicated by the occasional or continuous presence of at least 34 other predatory vertebrate spp. in the area. "... although, to some extent, every vertebrate species on the ... Monument affects the coyote, and is in turn directly or indirectly affected by it, it appears that the coyote plays rather a minor rôle in the ecology of any of the species it preys upon." No evidence was found indicating necessity of coyote control on the Lava Beds National Monument.—R. M. Bond.

14427. BRADBURY, HAROLD M. Management of apple trees in Massachusetts. *Jour. Wildlife Management* 3(3): 240-242. 2 pl. 1939.—To improve persistence of fruit, pruning and releasing in varying degrees and giving different exposures were tried. Best results were obtained from a 50% release to the south and west and no pruning of live wood. Grafts of *Malus floribunda* ("Bob-white") scions gave speedy and excellent returns, one grafted in 1936 bearing 12 apples in 1937. Grubbing around trees to remove competitive ground growth and the use of nitrates produced larger crops. Because of the difficulty and expense due to isolation, these trees are not sprayed and may become hosts to diseases and insects that would invade neighboring orchards. It is recommended that wild apple trees within

500 yards of commercial orchards be removed.—H. M. Bradbury.

14428. BUTLER, OVID (compiled and edited by). American conservation. In picture and in story. 144p. 216 fig. American Forestry Assoc.: Washington, 1935. Pr. \$2.50.—This is a book prepared for popular reading, with the text broken by many sub-headings and illustrations. As stated in the foreword, "Detail has been omitted to bring into bolder relief the more important outlines of the picture." While very little space is given any one topic, treatment is largely devoted to the history of exploitation and conservation of forest resources. The subject matter begins with a brief and simplified account of the origin of the earth and the succession of plant and animal life through geologic time. Next is a description of the New World as it existed at the time of its discovery by the white man. Following are chapters on more or less special phases of conservation problems and accomplishments, in which is included information on National and State Forests and Parks, the Public Domain, Indian Forests, the C. C. C., forest industries, the growth of forest education and research, protection and management of forests, soils, water, and wildlife.—P. L. Errington.

14429. CAHALANE, VICTOR H. The evolution of predator control policy in the National Parks. *Jour. Wildlife Management* 3(3): 229-237. 1939.—Since establishment of the first national park in 1872, policy as to protection or destruction of predators has fluctuated with official and public changes of opinion. With few exceptions until about 1925, control was pursued as vigorously as financial means permitted. Methods included trapping, hunting with dogs, poisoning and shooting, the latter being used most extensively after 1920 due to its greater selectivity. As thought advanced, the list of proscribed species became smaller and was finally restricted to the cougar, wolf, and coyote. All control finally ceased in 1935. Predators are and will be protected in the same measure as other park animals.—V. H. Cahalane.

14430. [Conservation of wildlife.] *Proc. of Conv. Internat. Assoc. Game, Fish and Conserv. Comm.* 29: 1-102. 3 fig. 1935; 30: 1-114. 1 fig. 1936; 31: 1-68. 4 fig. 1937.—The proceedings of the conventions of the International Association of Game, Fish, and Conservation Commissioners held in 1935, 1936, and 1937, are presented. A contribution on Research and Game-Management Units in Land Grant Colleges, by W. C. HENDERSON, is included in the report for 1935 (pp.87-90).—Courtesy Exp. Sta. Rec.

14431. COOK, DAVID B. Thinning for browse. *Jour. Wildlife Management* 3(3): 201-202. 1 pl. 1939.—Slashings in northern hardwoods are commonly used to produce browse but are costly to maintain. Moderate thinnings will produce continued crops of highly palatable browse without undue disturbance of the forest and at low cost.—D. B. Cook.

14433. HUME, C. W. The rabbit menace. *Empire Jour. Exp. Agric.* 7(26): 132-138. 1939.—In Britain rabbits must be controlled by cyanide fumigation and dogging, supplemented by shooting in special situations. The large-scale rabbit-trapping industry must be abolished in the interests of agriculture as well as of humaneness. Ferreting is allowable for supplying local markets of moderate size. In Australia the solution lies in the progressive reclamation of infested land by cyanide fumigation, the reclaimed land being secured by rabbit-proof fencing, by destruction of harbors and by dogging.—E. H. Tripp.

14435. MORSE, MARIUS. A local study of predation upon hares and grouse during the cyclic decimation. *Jour. Wildlife Management* 3(3): 203-211. 1939.—From the spring of 1935 to the spring of 1938, population fluctuations of *Bonasa umbellus* and *Lepus americanus* were determined for a 2,520-acre forest area in northern Minnesota by periodic censuses using the strip sample method. Greatest population losses occurred in 1935 and 1936, and decimation in the ranks of the grouse apparently preceded that of the hare. Neither was successful in bringing forth any appreciable number of young in 1935. Field observations during the winter of 1935-36 over a period of 4 months indicated that predators, especially raptors, utilized a relatively large percentage of the hares and grouse that were discovered

dead. In the same period, disease appeared to be of only very minor consequence as a factor directly responsible for the extensive hare mortality that was evident.—*M. A. Morse.*

14436. MOSS, A. E. Relation between take of upland game and agricultural land use in Connecticut. *Jour. Wild-life Management* 3(3): 269-278. 1939.—The Biological Survey research unit at Connecticut State College analyzed the take of game in the State for the years 1927-35 from the returns of hunters' licenses. These data were used in correlating the take of pheasants (*Phasianus colchicus*) and ruffed grouse (*Bonasa u. umbellus*) with the open cultivated and forested areas by towns and with the agricultural productivity of the towns rated from information furnished by the Agricultural Economics Department of the State College. The findings indicate that the pheasant population is closely related to soil productivity. The best agricultural lands produce greater returns to the hunter. Density of liberations does not seem to offset lack of soil quality or area in agricultural lands. The ruffed grouse population

shows close relationship to forested areas but does not fluctuate with soil quality.—*A. E. Moss.*

14437. ROMANOFF, A. L., G. BUMP, and E. HOLM. Artificial incubation of some upland game birds' eggs. *New York State Conserv. Dept. and Coll. Agric. Bull.* 2. 1-44. 9 fig. 1938.—These studies were conducted to determine the optimum environmental conditions applicable to the practical incubation of pheasant, grouse, and quail eggs and to establish recognizable symptoms by which the cause of unsuccessful hatches might be determined. When the agitated-air-type incubator with separate hatcher was used, an incubation temp. of 99.5° F and a relative humidity of from 63 to 68 for pheasants and from 60 to 65 for grouse and quail during the first 20 days of incubation proved most satisfactory. After the 20th day a slight decrease for both in the case of quail eggs proved desirable. Higher incubation temps. were required in the still-air-type than in the agitated-air-type machines. Turning eggs from 3 to 4 times a day and incubating them in a horizontal position are recommended. Other practical suggestions are outlined.—*Courtesy Exp. Sta. Rec.*

BIOLOGICAL ABSTRACTS

Editor-in-Chief, JOHN E. FLYNN; Assistant Editor, JEAN MACCREIGHT

VOLUME 13

DECEMBER, 1939

NUMBER 10

Entries 16115-18055

GENERAL BIOLOGY

Editors: A. H. GRAVES, *Plant*; C. A. KOFOID, *Animal*

(See also in this issue Entries 16152, 16157, 16166, 16208, 16305, 17001, 17002, 17003, 17339, 17469, 17742)

MICROSCOPY, INSTRUMENTS, TECHNIQUE

16115. AUMONIER, F. J. Notes on the distortion of paraffin sections. *Jour. Roy. Microsc. Soc.* 58: 253-257. 1938.—Graphic reconstruction of skull development from paraffin ribbons has shown a considerable degree of distortion of serial sections even after spreading. The question which the author seeks to answer is: do the sections, always creased and wavy, regain their full length? Of the many factors that have a bearing on this problem the following are studied: consistency (and melting point) of paraffin, shape of block, sharpness of knife, and angle of blade. It is found, by comparing paraffins of 52° and 53° C m. p., that low melting point paraffin is preferable. The sharpness of the blade is the limiting factor, i.e., it must be given the greatest care. Variations in the angle of the blade between 5° and 17° do not seem to cause appreciable difference of distortion. As distortion in paraffin is permanent, it is suggested that, whenever possible, celloidin, or double imbedding should be used.—*J. A. de Tomasi (courtesy Stain Technol.)*.

16116. BLAYDES, GLENN W. The use of Bismarck brown Y in some new stain schedules. *Stain Technol.* 14 (3): 105-110. 1939.—The staining quality of Bismarck brown Y may be improved and sterility maintained by adding 5% phenol to a 1% aqueous soln.—(1) Stem and root schedule: Mordant sections from water in 4% iron alum for 10 min. Rinse in distilled water and stain in 0.5% aqueous hematoxylin for 1 min. or until darkly stained. Rinse in distilled water and destain in 2% iron alum until a gray color appears. Rinse thoroughly in distilled water and intensify hematoxylin by transferring sections to 0.5% aqueous Li_2CO_3 until the desired black color appears. Rinse thoroughly in distilled water and stain for 1-5 min. in phenolic Bismarck brown. Rinse in distilled water, dehydrate successively in 30, 50, 70, 95 and 100% alcohol. Clear in methyl salicylate for 5 min., then to xylene for 3-5 min., and mount in balsam.—(2) Middle lamellae in wood: Destain more thoroughly in 2% iron alum than for the general stem and root schedule, and intensify in Li_2CO_3 for a longer period (about 1 hr.).—(3) White potato tuber sections: Modify above schedule by reducing time of destaining in 2% iron alum to about 30-60 sec. and intensify hematoxylin until starch grains appear bluish in color. Stain in phenolic Bismarck brown for 1-2 min.—(4) Wheat grain sections: Fix grain for sectioning when in "dough" stage. Use schedule the same as for potato tuber except for reducing time of staining in phenolic Bismarck brown to about 45 sec.—(5) *Tradescantia zebrina* epidermis: Strip epidermis from leaf while submerged in water. Fix in 100% alcohol 10 min., pass through 95, 70, 50, 30, and 10% alcohol to water. Stain in phenolic Bismarck brown for 10-20 min. Dehydrate, clear in methyl salicylate and mount in balsam.—*Auth. abst.*

16117. BOETGEHOLD, H. [An improvement of the field of view in microscope objectives.] *Zeitschr. wiss. Mikrosk. u. mikrosk. Tech.* 55: 17-25. 1938.—By the use of suitable menisci the author attempts to correct for the curvature of the field of view as is corrected by a homal in photography. The refractive index of such a lens should be positive or only slightly negative. For an objective of medium

power a single thick meniscus at the top is sufficient. Its concavity is far greater than its convexity, and is directed away from the object. For a higher power objective a smaller but stronger lens is used at the lower end, its concavity toward the object. Since these menisci have the chromatic error of converging lenses, a series is used at the top of the high power objective. This requires the use of compensating oculars. Planachromatic lenses for oil immersion can be made of 1.00 N.A.; with proper choice of dye and use of monochromatic light this becomes equivalent to 1.25 N.A.—*E. Barasch (courtesy Stain Technol.)*.

16118. CONN, H. J. Progress in the standardization of stains. *Stain Technol.* 14(3): 81-83. 1939.

16119. McWHORTER, FRANK P. Application of fine grain processing and condenser illumination enlarging to photomicrography. *Stain Technol.* 14(3): 87-96. 4 fig. 1939.—Photomicrographs involving great resolution are usually made by means of long initial projection, which involves the use of heavy, often cumbersome, apparatus designed to eliminate vibration. This paper evaluates the possibility of using an intermediate projection distance equal to or greater than 160 mm., which is considered the minimum efficient distance, and recording the initial negative image in very fine grain. Then by critical enlarging a positive image is obtained which closely approaches the resolution obtainable by the finest long projection equipment. The initial short projection permits elimination of vibration difficulties attending long exposures so that critical printing at magnifications above 2000× will give consistently good results, provided fine-grain technic is mastered by the operator.—*Auth. abst.*

16120. MARTIN, L. C. The present limitations in microscopy. *Jour. Quekett Microsc. Club Ser.* 4 1(2): 79-88. 2 fig. 1938.—Optical theory, problems, and methods are discussed. By the use of u.-v. light and the electron microscope, present limitations are rapidly being broken down.—*W. C. Tobie*.

16121. PORTER, C. L. Bound water as an aid in the preparation of microscopic mounts. *Tutor News* 17: 14. 1939.—Methods of mounting microscopical preps. which do not lend themselves to the balsam technic (e.g., glycerin jelly or Venetian turpentine) often fail to yield permanent or reliable mounts. The behavior of gelatin, which retains moisture indefinitely in the presence of formalin, has suggested the following mounting technic: Transfer material from water to a very dilute gelatin. Allow gradual conc. until a fairly firm jelly is formed (the slower the process, the less tendency there will be for the material to plasmolyze). Transfer a small portion of the jelly containing the material to a glass slide, warm gently until it melts, and apply a cover slip. Place 1-2 drops of formalin at the edge of the cover slip; let stand several hrs. to allow diffusion of the formalin; blot and wipe dry. Ring the mount with gold size, lacquer, or varnish.—*J. A. de Tomasi (courtesy Stain Technol.)*.

16122. SIMONDS, AUSTIN O. Dioxan dehydration for paraffin embedded Fucus slides. *Stain Technol.* 14(3): 101-102. 1 fig. 1939.—Fresh material is processed in a chromic-acetic-formalin fluid (Soln. A: 1% chromic acid 87 cc., glacial acetic acid 13 cc.; Soln. B: comm. formaldehyde 20

cc., water 80 cc.; mix A and B in equal quantities) for 24 hrs. and then carried through the following dehydrating schedule: Dioxan $\frac{1}{2}$, water $\frac{1}{2}$ for 2 hrs.; dioxan $\frac{1}{2}$ and water $\frac{1}{2}$ for 2 hrs.; 2 changes of 100% dioxan, 1 hr. each. Paraffin infiltration follows McWhorter and Weier's procedure except as to the time the materials are left in the solns. Following the 2d change of anhydrous 100% dioxan the pieces of *Fucus* are placed in infiltration soln. 1 (50 cc. dioxan, 5 cc. xylol, and 20 cc. of melted paraffin). The paraffin is allowed to "cake" and the liquid beneath the solidified paraffin is allowed to remain on the tissues at room temp. for 4 hrs. The pieces are transferred from soln. 1 to infiltration soln. 2 (50 cc. dioxan, 10 cc. xylol, 50 cc. melted paraffin), then placed in oven (50°-52° C) for 2 hrs. The next 2 changes are to soft paraffin for 2 hrs. Embed in paraffin. Sections cut 10 μ thick, fixed to the slide, are run through the following schedule: 100% xylol; 100% xylol; 95% alcohol; 60% alcohol; water; aqueous safranin (about 0.5%) for 10 min.; water; 50% alcohol; 95% alcohol; fast green F. C. F. (about 0.25% in 66 cc. of 95% alcohol + 33 cc. of anhydrous acetone). The slides are left in the fast green long enough to differentiate the reproductive organs, and are then placed in 100% acetone, then in carbol-xylol, then in 100% xylol, followed by 100% xylol, then balsam and cover glass. The slides are allowed to remain in each soln. down to water for about 5 min. The dilution of the alcoholic fast green staining soln. with acetone retards the action and makes it easier to use.

16123. STUDNICKA, F. K. [A container for the staining of microtome sections placed on glass.] *Zeitschr. wiss. Mikrosk. u. mikrosk. Tech.* 55: 43-44. 1938.—To accommodate slides of other than the usual size of 2.6×7.6 cm. and more of them without injuring freshly prepared sections to be stained and washed, the author devised the following vessels: (1) A crystallizing beaker, diam. 18 cm., with a vertical wall at least 7.6 cm. high (i.e., length of slides). (2) Another beaker to be placed inside it, diam. 15 cm., perpendicular walls 7.6 cm. high. (3) A 3d beaker of any height to cover the first two like a lid. Place the slides in the staining fluid between (1) and (2), the section facing the concavity of the outer wall, and other slides in water in the central beaker for washing.—*E. Barasch (courtesy Stain Technol.)*.

16124. WOLF, J. [A new method of marking certain areas in a section.] *Zeitschr. wiss. Mikrosk. u. mikrosk. Tech.* 55: 44-48. 1938.—A method of placing an easily recognizable, easily removable mark on the area of a section to be photographed without injuring the slide or impeding its examination has been proposed by the author. A transparent tape with a cross mark is placed on the cover glass. It consists of (1) transparent, sticky Durex cellulose tape, 19 mm. wide, (Durex Abrasives Corporations, 82 Beaver St., New York), the sticky layer consisting of gum and resin; (2) thin (0.14 mm.), transparent, cellulose tape, 24 mm. wide, with circular holes, diam. 10-12 mm., 5-6 mm. apart; (3) an ordinary thick, square or round cover glass, 18-20 mm. wide, bearing two diagonal lines, drawn with a lithographic pen, crossing in the center of the cover slip. Place tape (1) on tape (2), leaving only the perforations sticky. Place a cover slip on each 3d perforation; divide the tape, 19 mm. wide (Durex Abrasives Corporations, 82 Beaver St., New York), leaving only the perforations sticky. Place cross mark on the area to be studied and press it down on sticky holes holding it in place by a clip. Find area in field and focus for photography. Remove tape.—*E. Barasch (courtesy Stain Technol.)*.

16125. WYCHERLEY, S. R. Photomicrography and record photography with Dufaycolor. *Jour. Roy. Microsc. Soc.* 58: 244-249. 1938.—After a general discussion of the color materials available for photographic purposes, this paper describes the nature of the film in the Dufay-color process, in which the so-called réseau, or color mosaic, is an integral part of the sensitive emulsion. The fineness of ruling (40 lines to the mm.), together with the high order of transparency of the dyes used, combine to produce a medium peculiarly suited to the needs of scientific photomicrography. The transparency of the film gives ready-

made lantern slides. A set-up for this technic, as suggested, may require: 5-amp. white arc at 24 in. from substage, 6-in.-focus collecting lens, Dufay compensating filter, Abbe condenser, $\frac{1}{4}$ in. objective (N.A. 0.8, W.A. approx. 0.5), $\times 8$ eyepiece. The magnification is $\times 200$, the exposure for a medium-stained specimen 1/10 sec. Full instructions for processing the film are also appended.—*J. A. de Tomasi (courtesy Stain Technol.)*.

TAXONOMY AND NOMENCLATURE

16126. DOBELL, CLIFFORD. On "Teranympha" and other monstrous Latin parasites. *Parasitology* 31(2): 255-262. 1939.—In 1917, Koidzumi described *Teranympha mirabilis* in a Japanese paper; subsequently (1921), having revised and translated his paper while working in Dobell's laboratory, he corrected the generic name to *Teratonympha*, referring to his original name *Teranympha* as an orthographic error. Cleveland (1938) criticized the change as inadmissible under International Rules of Nomenclature; Dobell defends the change on the grounds that taxonomists generally have misunderstood (incorrectly translated) the French text of the International Rules of Zoological Nomenclature. The rule in question reads: "Art. 19.—L'orthographe originelle d'un nom doit être conservée, à moins qu'il ne soit évident que ce nom renferme une faute de transcription, d'orthographe ou d'impression." "... 'lapsus calami' is not a correct English translation of 'faute d'orthographe'. . . . The French rule says nothing about 'a slip of the pen,' but specifies 'an error in orthography' as one of the things which it is permissible to correct in a name: indeed, the rule implies that miswritten words are to be corrected."—The validity of the synonym *Cyclo-nympa strobila* Dogiel, 1917, is also considered: published in Russian during the period of the Russian Revolution, and not available for some years later, its "date of publication" for priority purposes should, the author holds, count from the time at which Dogiel's paper became available to the world at large.—Many solecisms in the zoological nomenclature are pointed out: illegitimate genitives made by attaching a Latin termination to a Greek root; and curious efforts to latinize, in the genitive, modern surnames or common names of host species; etc. Dobell cautions authors to acquaint themselves with at least the rudiments of Latin and Greek grammar and orthography before coining generic and specific names, and recommends acceptance of the principle that incorrectly formed names may be corrected.—*J. E. F.*

16127. NEAVE, SHEFFIELD AIREY (edited by). *Nomenclator zoologicus*. A list of the names of genera and subgenera in zoology from the tenth edition of Linnaeus 1758 to the end of 1935. In four vols. Vol. I, A-C. xiv + 957p. Zoological Society of London: London, 1939.

TEXTS AND EDUCATION

16128. HANNUM, CLAIR A., and WILLIAM H. BROWN. *Laboratory text in elementary zoölogy*. 180p. Stanford University Press: Stanford, 1939. Pr. \$1.50.

MISCELLANEOUS

16129. BAKER, O. E., RALPH BORSODI, and M. L. WILSON. *Agriculture in modern life*. viii + 303p. 40 fig. Harper and Bros.: New York, 1939. Pr. \$3.50.—This is primarily an economic and social survey of agriculture in the U. S. A., based on the biological factors of crop production, population, migration, nutrition, birth rate, scientific discovery, and the applications of science to agriculture. As a biological document it develops a field of great significance to all biological sciences but beyond their range.—*C. A. Kofoid*.

16130. SHELFORD, V. E., and R. E. YEATTER. Land holdings of North American universities with particular reference to grassland. *Ecology* 20(3): 450-454. 1939.

16131. ANONYMOUS. The present members of the Commission on Standardization of Biological Stains. *Stain Technol.* 14(3): 84-86. 1939.

BIOGRAPHY AND HISTORY

CARROLL W. DODGE, *Editor*

(See also in this issue Entries 16288, 17374, 17379, 17663, 17974)

HISTORY

16132. JOHNSTONE, JAMES T. John Jeffrey and the Oregon expedition. *Notes Roy. Bot. Gard. Edinburgh* 20 (96): 1-53. 1939.—An account of the life of Jeffrey and the plant collecting expedition on which he was sent to western N. America (1850-54). Insects and birds are briefly mentioned. The text is given of a scarce report (1853) which contains a list of plants. This is followed by an annotated list of plants which "Jeffrey collected or introduced" to Britain. Specimens of most are in the herbarium at Edinburgh. 326 Dicotyledons, 35 Conifers and 51 Monocotyledons are listed. There is a bibliography of 87 titles.—*J. A. Macdonald*.

BIOGRAPHY

16133. ADAMSON, R. S. Professor J. W. Bews. *Cape Naturalist* 1(6): 212-214. 1 fig. 1939.—A biography, 1884-1938.

16134. ALLEN, ARTHUR A. [Stuart Taylor Danforth, 1900-1938.] *Jour. Wildlife Management* 3(3): 279-280. 1939.

16135. COPELAND, HERBERT F. A portrait of John Gill Lemmon. *Madroño* 5(2): 77. 1 fig. 1939.—Reminiscences of the pioneer California botanical collector given by Mrs. Stacey Slipner. Photograph taken while Lemmon was serving in the Union Army.—*A. M. Carter*.

16136. CRUM, ETHEL. Alice Eastwood's eightieth birthday anniversary. *Madroño* 5(2): 74. Portrait. 1939.—Miss Eastwood is Curator of Botany of the California Academy of Sciences.—*E. Crum*.

16137. H. W. G. James William Edington [1889-1939]. *Jour. Path. and Bact.* 49(1): 264-265. Portrait. 1939.—British pathologist.

16138. HARRINGTON, C. R. George Barger [1878-1939]. *Biochem. Jour.* 33(6): 859-864. 1939.—Distinguished British chemist and physiologist.

16139. HASKELL, ROYAL J., and HOWARD P. BARSS. Fred Campbell Meier [1893-1938]. *Phytopath.* 29(4): 293-302. Portrait, 3 fig. 1939.—American phytopathologist, a passenger on the ill-fated Hawaii Clipper, which was lost

in passage from the U. S. to Manila. Meier was keenly interested in the dispersal of spores, pollen, etc. by air, and also in many other biological relations of the atmosphere—relations which he believed would comprise a fundamental science of "Aerobiology."

16140. P. N. B. O. L. H. Dudley Buxton [1890-1939]. *Jour. Anat.* 73(4): 676. 1939.

16141. PARISH, H. J. Charles Cyril Okell [1888-1939]. *Jour. Hyg.* 39(3): 217-223. Portrait. 1939.—Distinguished British immunologist, for several years editor of the *Journal of Hygiene*.

16142. PEVALEK, IVO. Stjepan Gjurašin [1867-1936]. *Acta Bot. Inst. Bot. Univ. Zagreb.* 10: 5-8. 1 pl. 1935.—Gjurašin had been a professor of botany at the Univ. of Zagreb since 1918. An account of his work in the fields of taxonomy, morphology, and cytology is given together with the complete citation of his 16 published papers.—*H. H. Chum*.

16143. RAMON, G. William Hallock Park. An eminent microbiologist and a great American public health officer [1863-1939]. *Jour. Immunol.* 37(3): 179-183. 1939.

16144. THOMPSON, J. WILLIAM. Ira C. Otis, 1861-1938. *Madroño* 5(3): 98-101. Portrait. 1939.—Mr. Otis, born in Wisconsin, spent his adult life in Washington. His hobby of botanical collecting resulted in the discovery of 2 spp. new to science, and in the extension of known ranges of many species. His herbarium is deposited at the State College of Washington, Pullman.—*A. M. Carter*.

16145. ANONYMOUS. Serafino Belfanti [1860-1939]. *Biochem. Jour.* 33(6): 864-865. 1939.—Distinguished Italian bacteriologist and biochemist.

16146. ANONYMOUS. Some Quekett notables. *Jour. Quekett Microsc. Club. Ser.* 41(3): 115. 1 pl. 1939.—Portraits and brief biographical sketches of Mordecai Cubitt Cooke, William Benjamin Carpenter, Thomas Henry Huxley, William Henry Dallinger, and Edward Milles Nelson.—*W. C. Tobie*.

16147. ANONYMOUS. Maurice Crowther Hall, 1881-1938. *Proc. Helminthol. Soc. Washington* 6(1): 9. 1939.

BIBLIOGRAPHY

Editors: CLARIBEL R. BARNETT and EILEEN R. CUNNINGHAM

(See also in this issue Entries 16230, 16822, 16889, 17385, 17604)

16148. BULLETIN OF THE WAHL-HENIUS INSTITUTE. No. 1. (15p.), [1937]. Published by the Wahl-Henius Institute, 64 East Lake Street, Chicago, Ill.—This series of Bulletins is intended to contain articles of scientific interest that have application in the field of practical brewing; results of the research department of the Institute; discussion of materials used in the production of beer and ale; and analyses of materials and products, with interpretation.

16149. CONTRIBUTIONS FROM THE NEW SOUTH WALES NATIONAL HERBARIUM. Vol. 1, no. 1, July, 1939. (39 pages). Publ. by New South Wales Department of Agriculture.—This volume comprises the following papers: Revision of the indigenous species of *Festuca* Linn. in Australia, by JOYCE W. VICKERY; The naturalized flora of New South Wales (excluding *Gramineae*), by R. H. ANDERSON; Additions to the Australian *Myrtaceae*; and Variation in *Cynodon dactylon* Rich and *Cynodon incompletus* Nees, by D. O. CROSS.

CYTOLOGY

Editors: R. E. CLELAND, *Plant*; C. E. McCLUNG, *Animal*

(See also in this issue Entries 16170, 16171, 16174, 16177, 16178, 16181, 16183, 16186, 16187, 16188, 16190, 16191, 16192, 17044, 17339, 17485, 17494, 17501, 17510, 17553, 17554, 17558, 17563, 17689, 17703, 17733)

GENERAL

16150. MENKE, WILHELM. Untersuchungen über das Protoplasma grüner Pflanzenzellen. 1. Isolierung von Chloroplasten aus Spinatblättern. *Hoppe-Seyler's Zeitschr. physiol. Chem.* 257(1): 43-48. 1938.—The procedure is based upon the isolation of chloroplasts from aqueous extracts by use of their different physico-chemical properties, such as specific gravity, solubility, isoelectric point. After a removal

of the heavy nuclear-cell-matter a quantitative separation between chloroplasts and cytoplasm-substance was carried out with leaves of *Spinacia oleracea*.—*M. Neuhoj*.

PLANT

16151. GUILLIERMOND, ALEXANDRE, et ROGER GAUTHERET. Sur la détermination du pH des cellules de levures (*Saccharomyces cerevisiae*). *Compt. Rend. Soc.*

Biol. 130(12): 1202-1204. 1939.—The yeasts were cultivated in Schoen's liquid or K phosphate 1:100 with addition of 5 mg.% of the dyestuff to be examined. Cresyl violet (rH 8.3) is fixed in the cytoplasm of the vacuole and reduced there. Phenosafranin (rH 5.8) and alizarin blue (rH 8.3), however, are not adsorbed by the yeast and, therefore, cannot be used. Janus green penetrates into the cells, is intensely fixed and reduced by the cytoplasm and its pink derivative is irreversible. In a nutrient-free liquid (1% K-phosphate at pH 9) the yeasts retain the leuco-derivative and are stained pink when the medium is aerated. This occurs at rH 5 after a very long time and under exceptional conditions. rH 5 seems to be the lowest value that can be measured in yeasts.—H. Simons.

16152. HILLARY, B. B. Improvements in the permanent root tip squash technic. *Stain Technol.* 14(3): 97-99. 1939.—Root-tip squashed preps. mounted in the acetic acid-corn syrup mounting medium (Hillary, *Stain Technol.* 13: 161-167. 1938) sometimes become decolorized and worthless, though the corn syrup-water mounting medium has always given good results. Because of the variability of commercial corn syrups the author recommends dioxan-balsam mounts, made as follows: Fix 30-60 min., preferably in a Navashin type fixative; wash 30 min. or longer in running water; treat 15 min. in 4% (by volume) NH_4OH at 60° C in a corked vial; wash 30 min. in running water to remove soluble pectate; hydrolyze 8 min. in N HCl at 60° C; stain 20 min. or longer in fuchsin-sulfurous-acid; bleach in 3 changes of SO_2 -water for at least 10 min. per change; dehydrate in 3 changes of dioxan of 3 min. each; place a root tip in a drop of dioxan-balsam on a slide, separate into fine longitudinal strands by means of sharp needles; press on a cover slip.

16153. HRUBY, K. The cytology of the Duke cherries and their derivatives. *Jour. Genetics* 38(1/2): 125-131. 1939.—Duke cherries are tetraploid ($n=8$). At meiosis their chromosomes form a high proportion of quadrivalents, unlike the tetraploid sour cherry (*Prunus cerasus*). In a hybrid of Duke X sour cherry, chromosome behavior resembled that in Duke vars. In hybrids of Duke and sweet cherries (*P. avium*) there was a high proportion of quadrivalents, up to 100% in $\frac{1}{2}$ of the crosses. The Duke cherries therefore behave as autotetraploid forms of *P. avium*.—H. B. Glass.

16154. KOSTOFF, DONTCHO. Irregularity in the mitosis and polyploidy induced by colchicine and acenaphthene. *Compt. Rend. (Doklady) Acad. Sci. URSS* 19(3): 197-199. 4 fig. 1938.—When grains of *Triticum* and *Secale* were treated with acenaphthene, most of the cells of the seedlings were larger than in normal seedlings. Many cells have 2 or more nuclei, some of which may be gigantic. The nuclei also contain many nucleoli, the size and number varying with the size of the nuclei. In the root tips and young leaf cells of *T. vulgare* ($2n=42$), more than 42 chromosomes were found. Likewise in *T. monococcum* ($2n=14$), cells were often found with 28 chromosomes and others with over 50 (perhaps 56) chromosomes. Also in *Secale* ($2n=14$), cells were found with 14, 23, and ca. 56 chromosomes. Since seeds treated with acenaphthene recover more rapidly than those treated with colchicine, since acenaphthene is only slightly soluble in water and no attention needs be paid to concentration, and since colchicine is much more toxic, acenaphthene would seem to be a better and more convenient agent for producing polyploidy than colchicine.—Oran Raber.

16155. KUWADA, Y., SHINKE, N., and G. OURA. [Artificial uncoiling of the chromonema spirals as a method of investigation of the chromosome structure.] *Zeitschr. wiss. Mikrosk. u. mikrosk. Tech.* 55: 8-14. 1938.—By the use of a soln. causing an alkaline reaction in plant spermatocytes, leaf epidermal nuclei, and pollen mother cells of *Tryxalis nasuta*, *Spiranthes australis*, *Impatiens balsamina*, *Tradescantia reflexa*, etc., an attempt was made to dissolve the chromosome matrix and follow the steps in the process of uncoiling of chromonema spirals. Cells treated in this way previous to the usual acetocarmine stain show solid chromosome masses, irregularly drawn out spirals, and other stages of haplomitosis in much more detail than do ordinary preparations. The following chemicals were used: ammonia vapor, NH_4OH (M/100), NH_4Cl (0.5 M), NH_4SCN (0.5 M), $(\text{NH}_4)_2\text{SO}_4$ (0.25-0.5 M), KCN (2^{-2} , 2^{-1}

M), KOH (0.003 M), NaOH (0.003 M), NaCN (2^{-2} , 2^{-1} M), Na_2HPO_4 (0.2 M), NaOCl (2^{-2} M), NaHCO_3 (2^{-2} M).—E. Barasch (courtesy *Stain Technol.*).

16156. LEFÈVRE, JOSEPH. Similitude des actions cytologiques exercées par le phenylurethane et la colchicine sur des plantules végétales. *Compt. Rend. Acad. Sci. [Paris]* 208(4): 301-304. 1939.—Seeds of wheat, either before or during germination, were treated for 48 hrs. at room temp. with vapors of phenylurethane, or with a saturated soln. diluted 15 to 20 times. This treatment resulted in hypertrophy of the coleoptile, mesocotyl and root growing point, and finally in arrested growth. Mitosis was blocked and large nuclei with many chromosomes were formed.—E. Weier (courtesy *Stain Technol.*).

16157. LEITNER, J. [The use of acetocarmine in the study of the contents of mature, completely dried pollen grains.] *Zeitschr. wiss. Mikrosk. u. mikrosk. Tech.* 55: 48-50. 1938.—Pollen grains are noted for retaining their germinative power a long time. The author shows the presence of 1, 2, or 3 cells within pollen grains as much as 112 years old. Due to the hardness of some of the husks, the grains could not be crushed and emptied. This was remedied by soaking them a few minutes in acetocarmine on a slide. The outlines of the sperm cells soon become recognizable. In 24 hr. they are as distinct as in fresh pollen grains. After breaking the husks, the staining time is no longer than with fresh grains. Species of the families Labiatae, Liliaceae, Ranunculaceae, etc. were used for expt.—E. Barasch (courtesy *Stain Technol.*).

16158. MAUDE, PAMELA F. A list of the chromosome numbers of species of British flowering plants. *New Phytol.* 38(1): 1-31. 1939.—The present list is an attempt to apply our knowledge of chromosome numbers systematically to the study of an extensive flora (that of the British Isles). Of the 526 genera of flowering plants found in Britain, 444 have been examined. Genera in which apomixis plays an important part were marked specially, since apomictic species have not the same genetic significance as sexual species. The species included in the list are derived from the London Catalogue and from contributions of workers at Kew. Certain systematic conclusions are derived from the numbers in this list in the light of what is known of the ways in which somatic chromosome numbers ($2n$) may change. These are (broadly speaking) of 3 kinds: (1) Polyploidy; (2) a change in the basic (n) number—such as an increase by a process equivalent to fragmentation or a decrease by one equivalent to fusion; and (3) a simple reduplication of one or 2 members of the basic set. There is, however, a 4th kind of change which is of no systematic importance, namely, the reduplication of small broken chromosomes which are usually inert and are irregularly inherited.—J. R. King.

16159. NAVASHIN, M. Influence of acenaphthene on the division of cells and nuclei. *Compt. Rend. (Doklady) Acad. Sci. URSS* 19(3): 193-196. 3 fig. 1938.—Seeds of wheat, oats, and *Crepis capillaris* were treated with acenaphthene. The seeds started to germinate normally but within 24 hrs. characteristic alterations appeared. These consisted mainly in the swelling of the hypocotyl and the base of the radicle. Later this spread over the root tip, where formation of root hairs was inhibited; and within 2-3 days seedling developing ceased entirely. If seedlings 2-3 days old were injected with acenaphthene, they suffered the same changes within 1-2 days. When the root tips were examined cytologically (especially *Crepis*), tetraploid and even octoploid sets of chromosomes were found. The original cells also become divided up by walls. Haploid chromosome sets also were found, the significance of which is discussed.—Oran Raber.

16160. SHMUCK, A. The chemical nature of substances inducing polyploidy in plants. *Compt. Rend. (Doklady) Acad. Sci. URSS* 19(3): 189-192. 1 fig. 1938.—Acenaphthene affects cell division similarly to colchicine but is not toxic. Its chemistry and physiological activity are compared with those of colchicine.—Oran Raber.

ANIMAL

16161. CREW, F. A. E., and P. C. KOLLER. Cytogenetical analysis of the chromosomes in the pig. *Proc. Roy. Soc. Edinburgh* 59(2): 163-175. 1939.— $2n=38$. The 2 sex chromo-

mosomes are unequal in size; the Y is $\frac{1}{3}$ the total length of the X-chromosome. The structure of the sex bivalent suggests that the centromere lies between the pairing and differential segments. The number of chiasmata per nucleus at mid-diplotene and metaphase of meiosis is the same, there is very little if any terminalization. Chiasma formation is apparently localized in the 5 larger bivalents. Gene recombination in these bivalents is limited. Those genes which are located between 2 adjacent chiasmata may be excluded entirely from recombination. In one individual a chromosome pair was heterozygous for an inversion.—*Authors.*

16162. HARD, WALTER LEON. The spermatogenesis of the lycosid spider, *Schizocosa crassipes* (Walckenaer). *Jour. Morph.* 65(1): 121-150. 3 pl. 1939.—This paper deals in particular with chromosome behavior during the premeiotic and meiotic divisions. The structure of the spider testis and the origin of definitive germ cells in the mature testis are described. Gonial chromosomes are already longitudinally split in early prophase stages. The diploid chromosome complement is represented by 20 autosomes and 2 accessory chromosomes. Tetrad formation can be accurately determined since 1) a confused stage does not occur during the 1st meiotic division, and 2) the polarity of the chromosomes may always be detd. by a centromere attachment to the nuclear membrane. The importance of considering the behavior of the centromere in tetrad formation, and for the determination of the segregational division, is discussed. The 1st meiotic division is reductional for the accessory chromosomes and possibly for the autosomes. A presynaptic split is present in the chromosomes during stages immediately following the gonial telophase. Late-telophase chromosomes of the 2d meiotic division are also longitudinally split. A longitudinal split occurs in the accessories during the diplotene stage but the resulting chromatids are

not separated until the 2d meiotic division. Warren's reports of an amitotic origin of δ germ cells in spiders are not substantiated.—*Auth. (courtesy Wistar Bibl. Serv.).*

16163. KAUFMANN, B. P. Induced chromosome rearrangements in *Drosophila melanogaster*. *Jour. Heredity* 30(5): 179-190. Frontispiece, 19 fig. 1939.—Types of chromosome aberrations detected by analysis of salivary glands of F_1 larval progeny of irradiated $\delta\delta$ included inversions, deficiencies, duplications, translocations and various combinations of these involving 2 or more chromosomes. Selected rearrangements are described and their significance appraised with respect to current cytologic problems.—*B. P. Kaufmann.*

16164. KOONZ, CARL H. Spermatogenesis of a haploid parthenogenetic hymenopteran, *Spilocryptus extrematus* (Cresson). *Trans. Amer. Microsc. Soc.* 58(3): 292-303. 26 fig. 1939.—*S. extrematus* is an ichneumon-fly, the principal primary parasitoid of the moth *Samia cecropia*. The $\delta\delta$ normally have 10 chromosomes, the ♀♀ 20. The meiotic behavior in the $\delta\delta$ evinces the peculiarities characteristic of organisms having but a haploid set. The progeny of virgin ♀♀ are normally $\delta\delta$. Thus, cytology confirms genetics in establishing haploidy as normal for $\delta\delta$. Half-spindle fibers are regularly formed in metaphase concurrently with the pinching off of the non-nucleated 1st spermatocyte cytoplasmic bud. The 2d spermatocyte division is normally equal, producing 2 spermatids. Oocyte-like cells and associated nurse cells occur in numerous testes. These peculiar cells can be recognized as oocyte-like cells before disintegrating.—*C. H. Koonz.*

16165. ZUITIN, A. I. New data on the chromosome number in yak (*Poephagus grunniens* L.). *Compt. Rend. (Doklady) Acad. Sci. URSS* 19(3): 201-202. 3 fig. 1938.—Chromosomes were counted in spermatogonial metaphases; $2n=60$.—*O. Raber.*

GENETICS

Editors: ORLAND E. WHITE, *Plant*; SEWALL WRIGHT, *Animal*

(See also in this issue Entries 16153, 16154, 16158, 16161, 16163, 16215, 16217, 16224, 16225, 16498, 16601, 16838, 16854, 16989, 17060, 17072, 17081, 17102, 17115, 17229, 17230, 17365, 17501, 17510, 17568, 17569, 17585, 17592, 17632, 17638, 17695, 17806, 17816, 17817, 17840, 18003)

PLANT

16166. BEADLE, G. W. Teosinte and the origin of maize. *Jour. Heredity* 30(6): 245-247. 1 fig. 1939.—When subjected to heat the seeds of teosinte explode as do kernels of popcorn. These popped kernels are entirely separated from the hard inedible hull normally enclosing them and are admirably suited to human consumption. The hypothesis is suggested that prehistoric American man discovered this means of utilizing teosinte as food, developed methods of cultivation for the plant and over a period of many hundreds of years selected the combination of 5 or more major and the many minor gene and chromosome mutations that now distinguish cultivated maize from its presumed wild ancestor.—*G. W. Beadle.*

16167. DESHPANDE, R. B. Studies in Indian chillies. 5. Inheritance of anther colour and its relation to colour in petal and node in *Capsicum annum* L. *Indian Jour. Agric. Sci.* 9(2): 185-192. 1939.—The paper describes the results of crosses between a yellow-anthered mutant chilli, Type 11A, and 2 Pusa Types, Type 3 (with purple petals, anthers and nodes), and Type 29 (with white petals, purplish yellow anthers and pale purple nodes). The yellow anthers of T.11A are recessive to the 2 kinds of purple anthers found in Type 3 and Type 29 respectively on a 3:1 ratio. The expression of purple color in any organ is dependent on the presence of a factor S, which also determines the purple color both in anthers and nodes. The segregation of anther and node color in relation to petal color is on a ratio of 36 purple petal, anther and node:12 white petal, purple anther and node:16 white petal, yellow anther and green node.—*R. B. Deshpande.*

16168. EMMONS, C. W., and ALEXANDER HOLLAENDER. The action of ultraviolet radiation on dermatophytes. II. Mutations induced in cultures of dermatophytes by exposure of spores to monochromatic ultraviolet radiation.

Amer. Jour. Bot. 26(7): 467-475. 12 fig. 1939.—A method of exposing a suspension of dermatophyte spores to u.v. radiation and measuring the energy expended is described. When spores of *Trichophyton mentagrophytes* were thus exposed lethal and secondary effects (mutant production) were observed, and were greatest after exposure in the region of 2537 Å and 2650 Å. Rate of mutation reached a maximum at certain energy levels (when these spores were exposed to radiation of 2650 Å the maximum was at 100×10^{-4} ergs per spore) and decreased with increasing amts. of energy (increased time of exposure). The mutants were placed in 6 arbitrarily delimited groups. Most showed an increase in pigmentation and a decrease in growth rate. A few were indistinguishable from other spp. and other vars. of dermatophytes. The mutants were comparatively stable. No mutants appeared in 2000 control colonies isolated from nonirradiated spores, but when spores from old cultures of the original strain were isolated, several mutants appeared, some of them being similar to those induced by radiation. U.v. radiation merely accelerated the rate of mutation.—*Authors.*

16169. FOWLDS, MATTHEW. Seed color studies in biennial white sweet clover, *Melilotus alba*. *Jour. Amer. Soc. Agron.* 31(8): 678-686. 1939.—Crosses involving green, yellow and pale yellow seed color were studied in F_2 and F_3 . The seed coat color was similar to the embryo color in green and in yellow seed. The seed coat was white and the embryo yellow in pale yellow seed. In crosses between yellow and green and between yellow and pale yellow, the yellow color was dominant and segregated approximately in a 3:1 ratio. Mottling was found in green as well as in yellow seed. In a cross between green and pale yellow (white seed coat), the F_1 plant produced seed with a yellow seed coat. Complementary factors apparently are necessary for the expression of color in the seed coat. A water soluble pigment was found in green and in yellow seed coats, but not

in white seed coats. Pigment in the embryo was not soluble at temperatures favorable to germination. The forms intercrossed readily when grown in the field.—*M. Fowlds.*

16170. HAUSTEIN, E. Die Chromosomenanordnung bei einigen Bastarden der *Oenothera argentea*. *Zeitschr. indukt. Abstamm.- u. Vererbungsl.* 76(3/4): 411-421. 1939.—The F_1 progeny of *O. berteriana* \times *argentea* are l . ha with rings of $6+6+2$ at meiosis and B . ha with $8+4+2$. *O. odorata* \times *argentea* gives v . ha with $10+2+2$ and l . ha with $4+4+2+2+2$. The large amount of segregation and crossing over evident in the genetic results of the latter cross is explained by its cytology.—*G. L. Stebbins, Jr.*

16171. HAUSTEIN, E. Die Analyse der *Oenothera brachycephala*. *Zeitschr. indukt. Abstamm.- u. Vererbungsl.* 76(3/4): 487-511. 1939.—The species is a complex heterozygote with the complexes l_b and v_b which correspond to the l of *O. berteriana* and the v of *O. odorata*. Reciprocal crosses indicate that the plasma of *O. brachycephala* is similar to that of *O. berteriana* and different from that of *O. odorata*.—*G. L. Stebbins, Jr.*

16172. HAYES, H. H., and I. J. JOHNSON. The breeding of improved selfed lines of corn. *Jour. Amer. Soc. Agron.* 31(8): 710-724. 1939.—Inbred lines were bred by the pedigree method from crosses between inbreds where as a rule one parent at least of each cross was outstanding in ability to withstand lodging and in smut resistance. Selection during the segregating generations was made in selfed lines for plant vigor, smut resistance, and ability to withstand lodging. Evidence is given to show the extent to which the inbreds were improved in various characters; in general, the methods used appeared to lead to distinct improvement in many characters. The inbreds produced by the pedigree method were studied in inbred-variety crosses to determine their combining ability. The evidence indicated that lines of good combining ability are obtained more frequently from crosses between inbreds that themselves are good combiners than from crosses between inbreds that are low in combining ability. Combining ability, therefore, is an inherited character. 12 characters of the inbreds, many of these related to growth vigor were studied in relation to the yield of inbred-variety crosses. Using the multiple correlation coefficient it was shown that there was a significant association between the vigor of inbred lines and their combining ability in inbred-variety crosses. Using inbreds that combined well in inbred-variety crosses, and making appropriate single crosses, it was evident that single crosses between unrelated inbreds gave a significantly higher number of high yielding single crosses than when the crosses were made between inbreds that were closer in genetic relationship as measured by their origin.—*H. K. Hayes.*

16173. KNIGHT, R. L., and T. W. CLOUSTON. The genetics of blackarm resistance. I. Factors B_1 and B_2 . *Jour. Genetics* 38(1/2): 133-159. 1939.—The genetics of leaf resistance to attacks of *Bact. malvacearum*, causing blackarm (angular leaf spot), was studied in crosses of a resistant American Upland strain of cotton with 2 susceptible Sudan Sakel strains. The F_1 shows nearly complete dominance of resistance. A backcross of F_1 to Sakel yielded a 3:1 ratio of resistant to susceptible, indicating 2 major factors were involved. Two more successive backcrosses of resistant to Sakel gave 3:1 ratios also. A straight F_2 gave a 15:1 ratio of resistant to susceptible, and F_2 's from the successive backcrosses gave 15:1 and 3:1 ratios in various families. The 2 dominant genes for resistance, B_1 and B_2 , act cumulatively. It proved possible to discriminate between their phenotypic effects, and to isolate them in strains otherwise Sakel in character. Stem resistance is positively correlated with leaf resistance. The greater resistance of the original Uganda B31 strain in comparison with the Sakel strain carrying B_1 and B_2 is attributed to modifying factors.—*H. B. Glass.*

16174. KOSTOFF, D. Heritable variations conditioned by euploid chromosome alterations. *Chron. Bot.* 5(1): 17-19. 1939.—Reasons are given why it appears desirable for investigators who attempt to produce polyploids for practical purposes (especially with colchicine and acenaphthene) to restrict their work chiefly to plants with small chromosome numbers and with short chromosomes.—*Courtesy Exp. Sta. Rec.*

16175. LANDES, MARGARET. The causes of self-

sterility in rye. *Amer. Jour. Bot.* 26(8): 567-571. 12 fig. 1939.—Selfed and crossed ovaries from the same plants of Prolific rye were examined in 2 successive years. In both selfed and crossed rye, certain embryo sacs remained unfertilized but the percentage was much higher in the selfed material. Twice as many embryo sacs aborted in the selfed rye as in the crossed. Deviation from normal development of the endosperm occurred in both selfed and crossed rye but was more marked in the former. In 5-10% of the ovaries examined no embryo sac developed.—*M. Landes.*

16176. LEHMANN, ERNST. Zur Genetik der Entwicklung in der Gattung *Epilobium*. *Jahrb. wiss. Bot.* 87(4): 625-641. 1939.—A variable amount of check in development occurs in different interspecific crosses in *Epilobium*. In reciprocal crosses, the check may occur only, or to a less degree, in one direction. *E. hirsutum* has several biotypes which produce check effects to different extents. Experimentally if a weak check type as φ is crossed with a strong check type as σ and the hybrid then crossed with *E. adenocaulon* (without check effect) as σ , the resultant finally segregates into weak and strong check types in ratio 1:1, as according to Mendelian segregation. This same ratio was obtained in the plasma of all tested *hirsutum* biotypes. This expt. was repeated with crosses of hybrids of *hirsutum* biotypes 29 and 43 with *adenocaulon*. Soon after germination the plants fell into 2 groups, A and B, very distinct in appearance, and approx. in the ratio 1:1. Differences became more distinct with continued growth. A and B types agree with those produced directly by crossing h 29 or h 43 with *adenocaulon* and therefore prove separation of the check factors during segregation. During further growth other segregated differences appear in both A and B groups, especially as regards normal and apetalous types. The check effects are stronger if *hirsutum* used as φ than in reciprocal, shown especially in flower size. Such results suggest that plasma also influences the check effect and works in the same direction as the genome. Differences between reciprocal crosses may be related to growth substance production and tests indicate on the whole that the strong check biotypes are poorer in growth substance. Conclusion is that gene-carried check factors are further influenced during development by extra-nuclear factors of the plasma or cell as a whole.—*J. H. Priestley.*

16177. LEHMANN, E. Erwiderung auf die Arbeit Heinz Brücher: "Die reziprok verschiedenen Art- und Rassenbastarde von *Epilobium* und ihre Ursachen. I. Die Nichtbeteiligungen von Hemmungsgenen." *Zeitschr. indukt. Abstamm.- u. Vererbungsl.* 76(3/4): 602-607. 1939.—The critical paper of Brücher, which appeared in the last vol. of this Journal, is answered point by point. On p.608, v. 76, is a rebuttal by Brücher.—*G. L. Stebbins, Jr.*

16178. LUTKOV, A. N. Tetraploidy in *Linum* induced by high-temperature treatment of the zygote. *Compt. Rend. (Doklady) Acad. Sci. URSS* 19(1/2): 87-90. 3 fig. 1938.—Plants of *L. usitatissimum* ssp. *mediterraneum* were subjected to temps. ranging from 40 to 48°C. After pollination, seed from these plants were planted and studied. The resulting plants were found in some cases to be tetraploids with 64 chromosomes. The tetraploid plant also had thicker stems and larger flowers. Also some flowers of the tetraploid plant had 6 petals. Pollen grains were larger and in many cases abortive.—*Oran Raber.*

16179. MCAULAY, A. L. Production of saltants of *Chaetomium globosum* by monochromatic ultra-violet irradiation. *Papers and Proc. Roy. Soc. Tasmania* 1938: 131-137. 1 pl. 1939.—The optimum dose of u.-v. radiation for the production of saltants in *C. globosum* is of the following order—Short wave-lengths, 230-265 $m\mu$, 2×10^7 ergs/cm.² 313 $m\mu$ and probably 334 $m\mu$, 200×10^7 ergs/cm.² 365 $m\mu$, if effective at all, 2000×10^7 ergs/cm.² The effectiveness of u.-v. radiation in producing saltants in *C. globosum* is very small (or perhaps zero) at λ as long as 365 $m\mu$. The ratio, saltant-producing effect/lethal effect, is smaller than for shorter wave-lengths. A saltant produced by irradiation, which was quite stable under normal conditions, saltated freely on irradiation and, among other things, reproduced the parent strain. There is some indication that saltants are produced selectively by different wave-lengths.—*From auth. summ.*

16180. MAXWELL, LOUIS R., and J. H. KEMPTON. Delayed killing of maize seeds x-rayed at liquid-air temperature. *Jour. Washington Acad. Sci.* 29(9): 368-374. 1 fig. 1939.—Dry maize seeds were subjected simultaneously to an x-ray treatment of 70,000 r units and to a reduced temp. of -187°C . Immediately following this treatment the seeds were brought up to room temp. and subsequently planted in the greenhouse together with controls. The use of liquid air did not greatly change the type of response, called delayed death, which normally occurs for these dosages. However, these plants grew significantly taller than those from seeds receiving the same dosage but no cooling. Delayed killing of maize is apparently not due primarily to temp.-dependent thermochemical reactions which might take place during the time of irradiation. However, factors producing delayed death are diminished by the use of liquid air temp. during irradiation.—Authors.

16181. MIKHAILOVA, K. A. Chromosome morphology of cotton. *Compt. Rend. (Doklady) Acad. Sci. URSS* 19(3): 181-184. 1 fig. 1938.—It is emphasized that the amphidiploid nature of the chromosome-set of New World cottons with $2n=52$ is wholly evident, but one of the 2 sets that compose it may be identified only approximately with the set of Old World cottons; the other, with the set of the American cottons ($2n=26$). The hypothesis of Skovsted on the origin of the New World cottons with $2n=52$, however, seems the most probable if considered from the cytological point of view.—O. Raber.

16182. MILAN, ANGELO. Sensibilita per la "Ustilago tritici" (Pers.) Jens. di alcuni ibridi normali di frumento. [Susceptibility of some normal hybrids of wheat to *U. tritici*.] *Riv. Patol. Veg.* 29(1/2): 71-84. 1939.—A procedure was used which facilitated hybridization and contemporary floral infection. For 4 yrs. studies were made on the receptivity to *U. tritici* of the normal hybrids of wheat derived from 12 pairs of genitors. 11 vars. were used: 6 were very susceptible, 3 of medium susceptibility, and 2 very resistant. In all combinations used, direct and reciprocal crosses were compared. In no case was matroclinous or patroclinous heredity found. The F_1 hybrids from genitors of strongly contrasting behavior revealed the absolute dominance of the resistance character. In other combinations, the degree of susceptibility was shown to be identical or similar to that of the 2 parents. Because of the phenomena of tillering the percentage of infection in terms of plants was constantly higher than in terms of spikes. In studies on receptivity to *U. tritici* of F_1 hybrids, the degree of infection determined only by spikes may lead to error.—F. M. Blodgett.

16183. NOACK, K. L. Über Hypericum-Kreuzungen. VI. Fortpflanzungsverhältnisse und Bastarde von *Hypericum perforatum* L. *Zeitschr. indukt. Abstamm.- u. Vererbungsl.* 76(3/4): 569-601. 1939.—*H. perforatum* is tetraploid ($2n=32$), and is partially apomictic, reproducing by means of somatic apospory followed by pseudogamy. At meiosis in the pollen mother cells pairing is complete, but slight irregularities often occur at later stages, and 30-50% of the pollen is sterile. About 3% of normal reduced embryo sacs are formed; the rest are aposporic, replacing the degenerated gametophyte. With self pollination, most of the unreduced egg cells develop unfertilized, but some form hexaploid embryos, which rarely grow into mature plants. When pollinated by the diploid *H. acutum*, *quadrangulum*, or *pulchrum*, about half of the egg cells develop apomictically, and half become fertilized and produce pentaploid hybrids. These are phenotypically very similar to their *H. perforatum* parent.—G. L. Stebbins, Jr.

16184. PADDICK, MORRIS E., and HOWARD B. SPRAGUE. Maize seed characters in relation to hybrid vigor. *Jour. Amer. Soc. Agron.* 31(9): 743-750. 1939.—Ashby's theory that embryo size is a criterion of the productive vigor shown by maize hybrids was critically examined. Although the general effect of outbreeding inbred lines was to increase size of kernel parts, there was no satisfactory relation between embryo size and hybrid vigor. Embryo size of reciprocal hybrids varied greatly despite uniformity of mature plants. The ratio of endosperm to germ weight within a line was relatively constant regardless of kernel size. Forage-yielding ability of hybrids was not significantly correlated with increase of weight of germ of

hybrid kernels over that of the inbred seed. The technique of producing hybrid kernels on the same ear as their maternal inbreds is suggested as a means of studying the development of hybrids in the period between formation of the zygote and the maturity of the embryo.—H. B. Sprague.

16185. PIRSCHLE, K. Weitere Untersuchungen über die Auswirkung eines Gen-abhängigen Wirkstoffs bei *Petunia* in einem Propfversuch auf älteren Unterlagen. *Zeitschr. indukt. Abstamm.- u. Vererbungsl.* 76(3/4): 512-534. 1939.—Results reported in an earlier paper are supplemented by fuller data showing that the *dd* homozygote lacks a hormone which stimulates growth in length and size, but does not affect leaf or flower shape, since in these respects the scions always resemble phenotypically their own genotype.—G. L. Stebbins, Jr.

16186. SANDO, W. J. A colchicine-induced tetraploid in buckwheat. *Jour. Heredity* 30(6): 271-272. 1 fig. 1939.—A tetraploid buckwheat (*Fagopyron tataricum*) was produced by applying a thick paste of 1% colchicine in lanolin to the stems of 3-week-old seedlings. In general, the tetraploid plants were later in maturing, slightly taller, the main stems 33% greater in diameter, the leaves more irregular on their margins, thicker, deeper green, and 60% greater in diam. The pollen, flowers, and seeds also were appreciably increased in size over those of the normal plants.—W. J. Sando.

16187. SCHWEMMLE, J., und M. ZINTL. Genetische und zytologische Untersuchungen an *Eu-Oenotheren*: die Analyse der *Oenothera argentea*. *Zeitschr. indukt. Abstamm.- u. Vererbungsl.* 76(3/4): 353-410. 1939.—*O. argentea* (sect. *Raimannia*) is a structural homozygote with the constitution *ha. ha.*, and has complete fertility in both pollen and ovules. In crosses with either of the complex heterozygotes *O. berteriana* or *O. odorata*, 2 segregating types occur, but not in the expected equal ratios. In progeny of the heterozygote *l. ha.*, from *O. berteriana* \times *argentea*, new complexes resulting from crossing over between *l.* and *ha.* were obtained, but in other F_1 heterozygotes this was not found. The F_1 of *O. argentea* \times *berteriana* show reciprocal differences in the length of the calyx tube which are patroclinous. No such differences exist in *O. argentea* \times *odorata*. The F_1 seedlings of *arg.* \times *bert.* with *arg.* plastids are chlorotic and weak, but become normal as they mature. Subsequent generations have more normal seedlings. The seeds of *O. argentea* germinate slowly but this is not true of F_1 hybrids of which *arg.* is the ovulate parent.—G. L. Stebbins, Jr.

16188. SMITH, HAROLD H. The induction of polyploidy in *Nicotiana* species and species hybrids by treatment with colchicine. *Jour. Heredity* 30(7): 291-306. Frontispiece, 9 fig. 1939.—By meristem treatments with 0.4% colchicine and seed treatments with 0.2, 0.4, and 0.8% colchicine mature plants with a double number of chromosomes were obtained of the following *Nicotiana* species and hybrids: *N. tabacum*, *N. rustica*, *N. glauca*, F_1 (*N. tabacum* \times *N. glauca*), F_1 (*N. tabacum* \times *N. sylvestris*), F_1 (*N. glutinosa* \times *N. glauca*), and some *N. rustica* \times *N. tabacum* segregants. The autotetraploids of *N. tabacum*, *N. rustica* and *N. glauca* were characterized by smaller plant habit, smaller and thicker leaves with larger stomata and increased pollen sterility compared to the diploids. The polyploids of *N. tabacum* and *N. rustica* had larger seed than the diploids. Allotetraploids of the sterile F_1 's (*N. tabacum* \times *N. glauca*) and (*N. tabacum* \times *N. sylvestris*) were fertile, had wider and thicker leaves with larger stomata and were similar in growth habit to the F_1 's. Allotetraploids of the dwarf hybrid, *N. glutinosa* \times *N. glauca*, showed a marked increase in plant vigor, leaf size and pollen fertility over the F_1 . Hyperpolyploids of *N. rustica* \times *N. tabacum* segregants had smaller plant habit, smaller and thicker leaves with larger stomata and increased pollen fertility compared to undoubled sister plants.—H. H. Smith.

16189. SUTTON, EILEEN. The genetics of *Tropaeolum majus*. II. *Jour. Genetics* 38(1/2): 161-176. 1939.—Three new genes in the nasturtium, designated *N*, *M*, and *T*, produce as recessives dwarf growth habit, metallic sheen on petals with high pH, and partial inhibition of anthocyanin in petals respectively. *K* and *L* are complementary genes for petal spotting. A recessive gene (*g*) which causes failure of pollen to function was found linked to *b* (bushy growth)

habit). Linkage is established for *B* and *R*, for *B* and *M*, for *C* and *Y*. The gene order in the *B* chromosome is probably *G-B-R*. Independent segregation was found for *B-A*, *B-X*, *X-A*, *X-C*, *X-R*, *A-Y*, and *V-A*. Modifiers of *C* (*M*, *T* and *L*) are dominant in *cc* genotype, only partially so in *C* genotype. Presence of numerous pairs of complementary genes in this species may indicate tetraploidy. The physiology of genetic doubleness and the biochemistry of flower color are discussed.—*H. B. Glass*.

16190. UPCOTT, MARGARET, and JAMES PHILP. The genetic structure of *Tulipa*. IV. Balance, selection, and fertility. *Jour. Genetics* 38(1/2): 91-123. 1939.—The chromosomes in pollen grains of *T. eichleri* (diploid) and pentaploid *T. clusiana* are smaller than those in their root-tip cells and thus form exceptions to the general rule of common size. Centric fragment chromosomes arising from breakage of chromatid bridges following crossing-over in heterozygous inversions occur chiefly in triploids; they have been found in 4 spp. of *Tulipa*. In the pollen grains of triploids chromosomes are distributed at random (2 spp.; 1 garden var.) except in one species, where the loss of laggard chromosomes at meiosis skews the curve in the direction of haploid gametes. Segregation is random in tetraploids for the respective types of association observed. In pentaploid *T. clusiana* there is some elimination of laggards. This phenomenon seems to be negatively correlated with crowding (ratio of cell size to chromosome size). Diploid spp. and garden vars. are generally self-sterile, but within their groups are interfertile, although there is considerable zygotic loss during early years of growth. Triploids are intersterile. When crossed with diploids, triploid pollen fertility proves to be in general equal to the chance of producing haploid grains; unbalanced ♀ gametes of triploids function with little elimination. Various crosses have yielded aneuploids. Tetraploid spp. are self-fertile as a rule. A tetraploid garden var. was produced from an unreduced pollen grain of a triploid crossed on a diploid. Also triploid offspring arose from unreduced parthenogenetic seeds of a ♀ triploid parent.—*H. B. Glass*.

16191. WARMKE, H. E., and A. F. BLAKESLEE. Sex mechanism in polyploids of *Melandrium*. *Science* 89(2313): 391, 392. 1939.—This is a summary of work on colchicine-induced polyploids of a white-flowered race of *M. dioicum*. It is concluded that the Y chromosome carried ♂-determining elements, contrary to the situation in *Drosophila* and *Rumex*, where this chromosome plays no rôle in primary sex determination.—*Courtesy Exp. Sta. Rec.*

16192. WEIDNER-RAUH, E. Untersuchungen über die partielle Sterilität der Oenotheren. Das Pulver bei Eunothenen. *Zeitschr. indukt. Abstamm.- u. Vererbungslehre* 76(3/4): 422-486. 1939.—In various spp. the capsules contain a percentage of powder-like degenerated ovules at maturity. These contain megaspore tetrads when young but in most of them the embryo sac never develops. In some, non-functional, degenerating embryo sacs are found at anthesis. External conditions, such as nutrition and the effect of plasma and plastids, have no effect of the percentage of aborted ovules. In the crosses *O. argentea* × *berteriana* and *odorata* progeny of *F*₂ and later generations showed segregation for percentage of ovule abortion, indicating the presence of one or more genetic factors governing it. The sterility is best explained as due to a disharmony of the gene system caused by crossing over between chromosomes that are partly non-homologous.—*G. L. Stebbins, Jr.*

16193. WELLENSIEK, S. J. The newest fad, colchicine, and its origin. *Chron. Bot.* 5(1): 15-17. 1939.—A brief digest of the development of knowledge about the properties and effects of colchicine and its use to induce polyploidy.

ANIMAL (EXCEPT MAN)

16194. CSIK, L., and A. WOLSKY. Untersuchungen über die Wirkung einiger Genmutationen auf den Sauerstoffverbrauch von *Drosophila melanogaster*. *Biol. Zentralbl.* 59(7/8): 388-397. 2 fig. 1939.—The *O*₂ consumption, detd. by a refined Warburg method, of 93- to 96-hr.-old pupae from the wild type, miniature and the multiple recessive, scute-cross-veinless-vermillion-forked stocks was found to be 1.65 ± 0.06 , 1.28 ± 0.07 and 1.43 ± 0.04 cmm. per hr. per pupa, respectively. Calculated for 1 mg. dry weight the values in the same order are 4.89 ± 0.23 , 3.88 ± 0.24 and 4.97 ± 0.53 cmm.

per hr. Miniature reduces the intensity of cell respiration, while in the multiple recessive stock there is a reduction of the amt. of tissue undergoing respiratory metabolism. *O*₂ consumption throughout the pupal period follows a U-shaped curve.—*A. H. Hersh*.

16195. EATON, O. N., and V. L. SIMMONS. Hermaphroditism in milk goats. *Jour. Heredity* 30(6): 261-266. 1939.—Records of the U.S.D.A. herds of Saanen and Toggenburg goats since 1925 show 38 hermaphrodites among 343 kids in the former breed and 21 among 350 in the latter. Only certain bucks and does produce intersexes and in these matings the ratio of normals to hermaphrodites does not depart significantly from 3:1. (20.6% hermaphrodites). For both breeds combined the percentages of young born as singles, twins and triplets are 16.1, 61.1 and 22.2 respectively. One set of quadruplets was born during the period studied. There is a tendency for more hermaphrodites among triplets than in single and twin births. They occur with both ♂ and ♀ litter mates. In the Saanen herd the sex ratio was 54% ♂♂ to 46% ♀♀; in the Toggenburgs it was very nearly 50% of each sex. The % of triplets increases slightly as the age of the dam increases. Since the part of endocrines in sex modification must be recognized, the genetic factors concerned with hermaphroditism must act on the gonads during embryonic sexual differentiation in order to produce their effect. Elimination from the breeding herd of animals which have produced hermaphrodites should check the occurrence of hermaphroditism if the single recessive factor theory after further investigation proves to be true.—*O. N. Eaton*.

16196. FISHER, R. A. Selective forces in wild populations of *Paratettix texanus*. *Ann. Eugenics* 9(2): 109-122. 1939.—Six samples of *P. texanus* taken in different places in the U. S. and Mexico agree in demonstrating a mutual avoidance of different dominant variants. "Compounds" of different dominants are less frequent than they should be on any purely genetical theory. The genetical situation least favorable to the production of such compounds would be the complete absence of chromosomes carrying 2 or more of such dominant genes; as this condition would be brought about by the selective elimination of double dominants, it has been used as the basis of calculation. On this basis the elimination of double dominants in wild conditions is estimated to be not less than 40% in each generation. Equilibrium in the gene ratios between different competing dominants then requires that the survival of the homozygotes should in general be equally low. The minimal average selective intensities in favor of the heterozygotes for single dominant factors in the 3 largest samples are 6.6, 10.4 and 14.2% in each generation. Comparison with breeding data in *Apotettix eurycephalus* suggests that the selection in wild conditions between homozygotes for any one factor and the heterozygotes of the same factor may be largely due to inherent differences in viability. On the contrary the large selective advantage of single against double heterozygotes points to powerful and variable ecological causes of elimination.—*R. A. Fisher*.

16197. GORDON, CECIL, HELEN SPURWAY, and P. A. R. STREET. An analysis of three wild populations of *Drosophila subobscura*. *Jour. Genetics* 38(1/2): 37-90. 1939.—Wild populations from 3 localities in southern England were sampled by trapping fertilized ♀♀ and analysing them for recessive mutations with visible effects. No evidence of inbreeding in the wild populations was found. Only one sex-linked mutation was found. Autosomal abnormalities included (1) typical recessives of high penetrance; (2) rough eye characters intermediate in penetrance between (1) and (3); (3) vein abnormalities that showed unpredictable inheritance, with heterozygous penetrance approx. equal to homozygous penetrance; (4) non-inherited traits resembling typical recessives in phenotype. The vein abnormalities are probably due to multiple factors, several genotypes producing equivalent phenotypes. About 10% of the gametes tested from each of the 3 localities carried an autosomal recessive. While there were no significant differences between the populations in the frequency of *F*₂ families segregating mutant types, the relative proportions of abnormal flies from the three populations do differ, so that there is probably some genetic difference between them.—*H. B. Glass*.

16198. GOTTSCHESKI, GEORG, und ERNST PLAGGE.

Transplantationen von Augenimaginalscheiben bei *Drosophila melanogaster* und *Drosophila pseudoobscura*: Die Gene glass und lozenge. *Biol. Zentralbl.* 59(9/10): 489-494. 1939.—By the transplantation technique it was found that the genes, lozenge and glass (known as light in *pseudoobscura*), have no effect on the formation of the v^+ and cn^+ -substances in the body. The optic disks themselves lack the v^+ -substance in lozenge and in glass they lack the cn^+ -substance. For color to develop in lozenge the v^+ -substance needs to be supplied to the optic disks and in glass a substance which is independent of the v^+ - cn^+ -system but which is produced in the wild type.—A. H. Hersh.

16199. KRÖNING, FRIEDRICH. Ein neuer Fall von erblichem Zwergwuchs beim Kaninchen. *Biol. Zentralbl.* 59(7/8): 363-365. 2 fig. 1939.—Recessive dwarfism appeared in a stock of ermine rabbits, closely related to the Polish breed. The average birth weight was 13.7 g. against 34.9 for the normal. The longest surviving dwarf lived 5 days. Histological examination was negative.—A. H. Hersh.

16200. KÜHN, ALFRED. Über eine geschlechtstokoppelte Mutation des Zeichnungsmusters (dz) bei *Ephestia kühniella* Z. *Biol. Zentralbl.* 59(7/8): 347-357. 7 fig. 1939.—In the easily recognized sex-linked recessive mutant, "central dark field" (dz), the central field is not only darkened by change in form and color of the scales, it is also reduced in size by a shift of the distal and proximal symmetrical bands toward the center of the wing. Compared to the wild type, development of the dz-mutant takes about 7 days longer at 18°C, the average number of eggs laid is reduced by about 18%, the average number of progeny is reduced by about 40%.—A. H. Hersh.

16201. NORDBY, JULIUS E. Inequalities in the digits in swine. *Jour. Heredity* 30(7): 307-310. 3 fig. 1939.—Anatomical differences in both the chief and accessory digits of the porcine foot are described. In extreme cases they result in unequal weight distributions serious enough to be of practical importance to breeders. It is stated that the frequency and magnitude of the variations can be influenced by selection but detailed data on inheritance are not given.—L. M. Dickerson.

16202. PRABHU, S. S. Sterility mutations in *Drosophila melanogaster*. *Jour. Genetics* 38(1/2): 177-191. 1939.—Tests were made to determine the frequencies of δ -specific and ϕ -specific dominant sterility mutations following irradiation with x-rays. About 14% were found affecting F_1 $\phi\phi$. The frequency of δ -specific sterility factors was higher (1.7-2.5%) but these were mainly due to breakage or loss of the Y chromosome. Recessive sex-linked sterility genes evident in F_2 $\delta\delta$ amounted to about 2.5%. Localization of 8 of these showed that 5, and perhaps 7, were located in one region (garnet-forked) and may therefore be due to changes at a single locus. The results validate Berg's conclusions as to the difference between the frequencies of sterility mutations in the X chromosome and in the autosomes.—H. B. Glass.

16203. SCHILLING, L. Untersuchungen zur Variabilität der Meerschweinchenhaare und ihrer Pigmente. *Zeitschr. indukt. Abstamm.- u. Vererbungslehre* 76(3/4): 535-568. 1939.—The pigments of two "series of dilution" (Verdünnungsreihe) were investigated, a sepia series and a yellow series. The hairs of the sepia series have 4 kinds of pigment: (1) sepia pigment granules, (2) sepia pigment clots, (3) red corpuscles and (4) red, diffused pigment. Different intensity is due to (1) and (2). With increasing intensity of coat color, size, amount and color intensity of granules increases. In the hairs of the yellow series are (1) yellow pigment granules, (2) yellow pigment clots, (3) red corpuscles and (4) yellow, diffused pigment. Differences in coat color are produced by (1) and (2), probably also (4). With increasing intensity of coat color amount and intensity of (1) increases, the size remains constant. The intensity of (2) increases with the intensity of the coat color.—W. Braun.

16204. SEREBROWSKY, A. S. Genes scute and achaete in *Drosophila melanogaster* and a hypothesis of gene divergence. *Compt. Rend. (Doklady) Acad. Sci. URSS* 19(1/2): 77-81. 1 fig. 1938.—These genes near the left end of the X-chromosome are very similar, but they control different groups of bristles. The origin of such a high degree of specialization of genes is discussed; and it is decided that this particular differentiation had begun at least at the

beginning of the Tertiary and, more probably, as early as the Mesozoic. During this time there was an opportunity for hundreds of subsequent mutations in the *scute* and *achaete* genes, thus permitting the strict specialization now observed.—Oran Raber.

16205. STRASBURGER, EDUARD H., und LONTA KÖRNER. Untersuchungen über die Wirkung des Polyphän-Gens in der Entwicklung von *Drosophila funebris*. *Biol. Zentralbl.* 59(7/8): 366-387. 12 fig. 1939.—The normal embryonic development which requires about 31 hrs. at 25°C was studied at stages of 3-hr. intervals up to the time of hatching and compared with the changes in unfertilized and in pathological fertilized eggs of normal matings in order to have a basis of comparison for studying the effect of the dominant autosomal recessive lethal gene, *Pph*. A comparison of the percentage rates of larvae hatching in normal and *Pph* cultures shows that the *Pph* gene has an injurious maternal effect. The lethal effect occurs most frequently in the later embryonic stages (about 27 hrs.). The pathological disorganization may begin in the most diverse parts of the embryo, so that the seat of the primary degeneration was not established.—A. H. Hersh.

16206. TIMOFÉEFF-RESSOVSKY, N. W., und K. G. ZIMMER. Mutationsauslösung durch Röntgenbestrahlung unter verschiedener Temperatur bei *Drosophila melanogaster*. *Biol. Zentralbl.* 59(7/8): 353-362. 1 fig. 1939.—The report that lower temps. at the time of radiation produce a higher rate of mutation opens the possibility of further analyzing the processes involved. A further test of the matter, however, confirms the conclusion that the X-ray effect is independent of the temp. at the time of radiation. Doses of 1200 r at 7° and 32° and of 2750 r at 3° and 33° produced sex-linked mutations by the CIB method at the same average rate. The mutation constant (the average rate per 1 r) was about 2.88×10^{-6} for all temps.—A. H. Hersh.

16207. WARREN, D. C. Spike blade—a heritable single comb variation in the fowl. *Jour. Heredity* 30(6): 257-260. 1 fig. 1939.—This heritable variation of single comb appeared in Rhode Island Reds. The blade of the comb had a spike-like shape instead of the usual leaf-like form. Breeding results indicated that the major factor for spike blade is recessive but at times there appears to be incomplete dominance of the normal blade. There is also some evidence of modifying factors which tend to suppress the expression of spike blade.—D. C. Warren.

MAN

16208. BABCOCK, E. B., and R. GOLDSCHMIDT. A mechanized exhibit of human heredity. *Jour. Heredity* 30(6): 235-236. 1 fig. 1939.—This exhibit, in the Golden Gate International Exposition, consists of a wall panel 14' x 10' feet with 95 boy and girl dolls. It demonstrates 2 pairs of characters; dark vs. light hair and brown vs. blue eyes. The grandfather and grandmother are represented as homozygous dominant and recessive respectively. Below them appears their son with dark hair and brown eyes and on his right are 4 girl dolls each with a different combination of the 2 pairs of characters and wearing differently colored dresses. The spectator "chooses the bride" by pressing one of 4 buttons on the rail in front of the exhibit. Thereupon the 4 dolls disappear, the selected one reappears dressed as a bride and accompanied by the groom. Shortly thereafter covers are lifted from 1 or more alcoves on the lower part of the panel, disclosing the theoretical proportions of hair and eye color combinations among the possible families of children, together with equal proportions of boys and girls. Explanatory legends are printed on each side of the panel. Essential features of the mechanism are described.—E. B. Babcock.

16209. De SILVA, P. C. C. Hereditary ectodermal dysplasia of anhydrotic type. *Quart. Jour. Med.* 8(30): 97-115. 1939.—This disease is reviewed; it is probably sex-linked but not completely recessive.—H. G. Swann.

16210. FINNEY, D. J. Tests for sex-linkage in a quantitative character. *Ann. Eugenics* 9(2): 203-207. 1939.—Records of human stature collected by Sir Francis Galton were analysed by 2 methods, with the object of testing the possible existence of a sex-linked gene influencing stature. The first method used only the available fraternities and, on

account of internal contradictions, gave no certain conclusions. The 2d used also the parental statures and, while presenting no evidence for linkage, showed surprising differences among the parent-child correlations.—*D. J. Finney.*

16211. PRYOR, J. W. Normal variations in the ossification of bones due to genetic factors. *Jour. Heredity* 30(6): 249-255. 5 fig. 1939.—Attention is called to 2 normal variations in the ossification of bones. A great variation in the carpal sequence of ossification as illustrated in triplets and quadruplets showing a number of patterns could not be haphazard but is due to genetic factors. The Schense quadruplets present a variation that would indicate a trizygotic origin. The presence of an extra epiphysis at the central end of 2d metacarpal bone in all 6 hands of the Kerner triplets and in all 8 hands of the Morlok quadruplets is, in

the author's opinion, positive evidence that these variations in ossification are due to genetic factors.—*J. W. Pryor.*

16212. WOODS, FREDERICK ADAMS. The inheritance of strong parental instinct. *Jour. Heredity* 30(6): 237-244; (7): 313-320. 1939.—The author concludes—"that fecundity is inherited and in the upper classes, at least, correlated with mental and moral superiority, but that it is not so much physical as psychical and bound up closely with the parental instinct." Striking fecundity is noted among the wives of business men, of the higher nobility and especially of royalty of the sovereign grade. It is considered probable that many of the families studied may be expected to persist indefinitely and to increase in numbers of individuals. The data are taken from the 1923 edition of the *Almanach de Gotha*.—*L. M. Dickerson.*

BIOMETRY

JOHN W. GOWEN, *Editor*

(See also in this issue Entries 16267, 17026, 17029, 17455, 17466, 17566, 17571, 17587)

16213. BISHOP, D. J. On a comprehensive test for the homogeneity of variances and covariances in multivariate problems. *Biometrika* 31(1/2): 31-55. 1939.—The use of the Neyman and Pearson likelihood ratio method has enabled S. S. Wilks (*Biometrika*, 24, 471-94, 1932) to obtain a comprehensive criterion for testing the hypothesis that the corresponding variances and covariances in k samples drawn from normal multivariate populations are equal. The true sampling distribution of this criterion, l , when the hypothesis tested is true, being unknown, methods of approximating to it are considered in the case where each of the samples is of the same size n . It is found that a Pearson Type I curve in the form $p(l) = \{B(m_1, m_2)\}^{-1} l^{m_1-1} (1-l)^{m_2-1}$ will give an adequate approximation to the distribution of l , if the parameters m_1 and m_2 are chosen to obtain agreement between the 1st and 2d moments of the true and approximate distributions. Thus the significance levels for l may be obtained either, directly, from the Tables of the Incomplete Beta-Function or, by means of a transformation, from Fisher's z -tables. When n is not too small, empirical relations giving, with sufficient accuracy, m_1 and m_2 in terms of n , k and q , the number of variates, are obtained so that the labor of computing the moments may be avoided. The limiting form of the distribution of l is considered in the general case where the samples are large but not necessarily of the same size. An example illustrating the use of the test is worked out in full.—*D. J. Bishop.*

16214. DAVID, F. N. On Neyman's "smooth" test for goodness of fit. I. Distribution of the criterion χ^2 when the hypothesis tested is true. *Biometrika* 31(1/2): 191-199. 1 fig. 1939.—The distribution of the criterion χ^2 is discussed for the case when the hypothesis tested is true. The conclusion is reached that Neyman's assumption that χ^2 is distributed as χ^2 is valid for samples of 20 and over.—*F. N. David.*

16215. DAWSON, C. D. R. An example of the quasi-factorial design applied to a corn breeding experiment. *Ann. Eugenics* 9(2): 157-173. 1939.—The quasi-factorial method was used for the comparison of 27 vars. of maize. By this method the size of block could be reduced so that each replication contained 9 blocks of 3 vars. Under the conditions of the expt., however, the blocks did not eliminate any soil heterogeneity. The variables measured concerned earliness and yield and the data on earliness are used to demonstrate the method of computation.—*C. D. R. Dawson.*

16216. FISHER, R. A. The comparison of samples with possibly unequal variances. *Ann. Eugenics* 9(2): 174-180. 1939.—The exact test of the significance of the difference between the means of samples drawn from populations known to be equally variable was shown in *Statistical Methods* to be equivalent to that developed by "Student" for the mean of a unique sample. A parallel problem exists in which the variances of the hypothetical populations sampled may be unequal. The solution of this problem first put forward by Behrens in 1929, and supplying a neat example of fiducial probability, had been criticized by M. S. Bartlett (1936) on several diverse grounds. Bartlett was under a misapprehension on the numerical values of Behrens'

formula, which have since been tabulated by Sukhatme, and that the analytic solution is, as it claims to be, exact.—*R. A. Fisher.*

16217. HALDANE, J. B. S. Note on the preceding analysis of Mendelian segregations. *Biometrika* 31(1/2): 67-71. 1939.—In this note the author shows how a rather fuller χ^2 analysis of the mendelian data of the preceding paper results in the extraction of some further information of interest.—*E. S. Pearson.*

16218. JEFFREYS, HAROLD. Random and systematic arrangements. *Biometrika* 31(1/2): 1-8. 1939.—A distinction is drawn between randomness in the design of expts. and randomness in the sense of mutual irrelevance of the errors. The latter is what is needed for the validity of most statistical methods, and is not necessarily improved by the former. Examples are given from various subjects. The author agrees in general with Fisher's recommendation to estimate and eliminate known effects as accurately as possible and randomize the rest.—*H. Jeffreys.*

16219. JOHNSON, N. L., and B. L. WELCH. On the calculation of the cumulants of the χ -distribution. *Biometrika* 31(1/2): 216-218. 1939.—Formulae are given for calculating the cumulants of the χ -distribution, as far as the 6th, with considerable accuracy.—*B. L. Welch.*

16220. MORGAN, W. A. A test for the significance of the difference between the two variances in a sample from a normal bivariate population. *Biometrika* 31(1/2): 13-19. 1 fig. 1939.—The Neyman and Pearson likelihood ratio method is applied to derive a criterion for testing whether the variances in a sample from a normal bivariate population are equal. The test obtained depends only on the sample values of the variances and correlation coefficients but its power increases with the numerical value of the population correlation ρ . Being independent of ρ it appears to be the appropriate test criterion to use when ρ is unknown.—*W. A. Morgan.*

16221. NEWMAN, D. The distribution of range in samples from a normal population, expressed in terms of an independent estimate of standard deviation. *Biometrika* 31(1/2): 20-30. 1 fig. 1939.—The object of the paper is to consider the ratio $q = w/s$, where w is the range of a sample of n individuals from a normal population, and s is an independent estimate of the population standard deviation with f degrees of freedom. The expectation of q is first considered and a short table given, by use of which, in conjunction with existing tables, this expectation can be calculated. The methods of calculating the upper 5% and 1% levels of the distribution of q (exact for $n=2, 3$, approximate larger n) are given. Framework tables, correct to two decimal places, together with fuller tables, correct to one decimal place, are given. The paper concludes with 3 examples of the use of these tables in problems of analysis of variance.—*D. Newman.*

16222. PITMAN, E. J. G. A note on normal correlation. *Biometrika* 31(1/2): 9-12. 1939.—Suppose that X and Y are normally correlated variables and that we have a sample of n pairs of observed values (x_r, y_r) and wish to determine whether the sample values indicate that the

variances of X and Y are unequal. A simple and exact significance test is developed, which may be used when the exact value of the correlation coefficient of X and Y is unknown. It is also shown how fiducial limits for the ratio of the variances of X and Y may be determined. A similar method gives very easily the distribution required for the estimation of the correlation coefficient of X and Y when it is known that their variances are equal.—*E. J. G. Pitman.*

16223. PITMAN, E. J. G. Tests of hypotheses concerning location and scale parameters. *Biometrika* 31(1/2): 200-215. 1939.—Tests of certain hypotheses concerning location and scale parameters of chance variables are developed. These tests are unbiased and are applicable to chance variables with any continuous distributions. An application to the comparison of variances of normal variables yields Bartlett's test, which is thus shown to be unbiased. This test is discussed in detail. The Neyman-Pearson variances test is shown to be biased except when the samples are all of the same size.—*E. J. G. Pitman.*

16224. ROBERTS, E., W. M. DAWSON, and MARGARET MADDEN. Observed and theoretical ratios in Mendelian inheritance. *Biometrika* 31(1/2): 56-66. 1939.—Observed Mendelian ratios obtained in rats, mice and rabbits are compared to the theoretical expectations. From 1 to 5 allelic pairs are involved, giving 2 to 32 classes. For obtaining probabilities with 2 classes the formula $E = \pm 0.6745\sqrt{npq}$, and for a greater number of classes $\chi^2 = S \left\{ \frac{(M'_i - M_r)^2}{M_r} \right\}$, were used. Among 65 ratios, 5 depart significantly from the theoretical.—*E. Roberts.*

16225. UVEN, M. J. van. Adjustment of a ratio. *Ann. Eugenics* 9(2): 181-202. 1939.—From a set of pairs x_k, y_k ($k=1, \dots, n$), obtained by observation, the "best" value of the ratio y/x can be found by a goniometrical method of adjustment. Assuming that x_k and y_k have the same weight,* and that their true errors are normally distributed, the solution value $\bar{\phi}$ of $\phi = \arctan(y/x)$ is that which minimizes the sum $[g_k(-x_k \sin \phi + y_k \cos \phi)]^2$. Putting $[gxx] = A$, $[gxy] = B$, $[gyy] = C$, $\frac{1}{2}(A+C) = S$, $\frac{1}{2}(A-C) = D$, $+ \sqrt{(D^2 + B^2)} = R$, the solution value of ϕ is $\bar{\phi} = \frac{1}{2} \arctan(B/D)$, and the minimum value of the above sum is $S - R$. The mean error σ of weight 1 is connected with the asymptotic value $\langle S - R \rangle$ of $S - R$, and with the true (errorless) value S_0 of S . The quotient $\langle S - R \rangle / S_0$ is expanded into a series of ascending powers of σ^2 / S_0 . τ being the true error of $\bar{\phi}$ and W its probability, the quotient $\xi = \frac{\sin 2\tau}{\sqrt{(S^2/R^2 - 1)}}$ appears to follow the well-known distribution law of "Student," the probability density being $\frac{dW}{d\xi} = \frac{\Gamma(\frac{1}{2}n)}{\sqrt{\pi} \cdot \Gamma(\frac{1}{2}(n-1))} \cdot \frac{d\xi}{(1+\xi^2)^{\frac{1}{2}n}}$. In order to obtain the probability distribution of A , B and C , a geometrical (multidimensional) representation is used. For expanding $\langle S - R \rangle / S_0$ into a power series in σ^2 / S_0 the moment-

generating functions of S , D and B proved to be more useful.—*M. J. van Uven.*

16226. WEISS, M. G., and G. M. COX. Balanced incomplete block and lattice square designs for testing yield differences among large numbers of soybean varieties. *Iowa Agric. Exp. Sta. Res. Bull.* 257. 289-316. 1 fig. 1939.—The features of balanced incomplete block and lattice square designs, quasi-factorial arrangements adapted to the testing of differences between large numbers of vars., are described and their analysis and relative precision on soils of varying homogeneity illustrated by soybean variety trials. The efficiency factor of these designs, because of confounding of var. differences with block effects, is lower than that of randomized complete block designs, yet on soil of normal variability the designs permit elimination of enough variability due to soil differences to more than offset this loss. Merits of the lattice square arrangement were demonstrated on extremely heterogeneous soil where use of the design resulted in a gain in precision of 150% over that of randomized complete blocks. A case in which the design on very uniform soil results in a loss of precision of 31.5% is also illustrated. Use of these designs is recommended in variety trials involving numerous varieties when the trials are conducted on variable soil and when differences between vars. are small.—*Courtesy Exp. Sta. Rec.*

16227. WELCH, B. L. On the distribution of maximum likelihood estimates. *Biometrika* 31(1/2): 187-190. 1939.—A method of approximating the probability integral of the distribution of a maximum likelihood estimate is given.—*B. L. Welch.*

16228. WELCH, B. L. Note on discriminant functions. *Biometrika* 31(1/2): 218-220. 1939.—The problem of discriminating between two specified populations is discussed.—*B. L. Welch.*

16229. YATES, F. The recovery of inter-block information in variety trials arranged in three-dimensional lattices. *Ann. Eugenics* 9(2): 136-156. 1939.—In 1936 and subsequently a series of new exptl. designs for agricultural variety trials and other biol. expts., known as quasi-factorial and incomplete block designs, was introduced. As originally put forward these designs, though in general considerably more efficient than designs involving the use of controls, had the defect of being less efficient than ordinary randomized blocks if the reduction in variability resulting from the use of the smaller blocks was in fact small. This was a consequence of the fact that certain of the varietal (or treatment) comparisons were confounded with block differences, and the information contained in the inter-block comparisons was wholly discarded. In the present paper an account is given of the method of estimating the relative accuracy of these comparisons, and of recovering the information contained in them. Only the case of the 3-dimensional lattice is discussed here. It is proposed to deal with the other types of design in subsequent papers. With this modification the efficiency of these designs is shown to be always greater than that of ordinary randomized blocks.—*F. Yates.*

* That all observations are mutually independent.

ECOLOGY

Editors

W. C. ALLEE, *General Animal Ecology*
G. D. FULLER, *General Plant Ecology*
CHANCEY JUDAY, *Hydrobiology (Oceanography, Limnology)*

FREDERICK A. DAVIDSON, *Ecology of Wildlife Management—Aquatic*
W. L. MCATEE, *Ecology of Wildlife Management—Terrestrial*

ROBERT G. STONE, *Bioclimatology, Biometeorology*

(See also in this issue Entries [GENERAL AND ANIMAL ECOLOGY]: Trematode parasites, 17946; Collecting grass-inhabiting insects, 17978; Ants of Baltic States, 18026; Reptiles of Southwest U. S. A., 18053. [PLANT ECOLOGY]: Grasslands owned by American Universities, 16130; Pollen analysis, 16157; Pliocene communities of California, 17475; Pliocene in Oregon, 17478; Conifers of France, 17512; Vegetation of mts. of Montenegro, 17545; Vegetation above snow limit, Davos, 17549; Grazing effect on alfalfa-brome grass mixtures, 17597; Shelterbelts species, 17650; Eucalyptus, 17653; Fire and succession in Australia, 17659; Selenium—tolerant *Astragalus* spp., 17734)

BIOCLIMATOLOGY, BIOMETEOROLOGY

(Ultra-violet producing mutation in fungus, 16179; Extreme low temp. as affecting x-ray injury, maize, 16180; Climatic effects in grass root systems, Nebraska, 16265; Climate as affecting plankton in the Mediterranean, 16270; Marine plankton as indicators of aquatic climate, 16273; Animal behavior, 16282; Temp. blood composition relationship, 16423; Environmental temp. affecting respiration of rats, 16770; Carcinogenic substances in atmosphere, 16843; Relative humidity and temp. in refrigeration of poultry, 17093; Growth of chicks, 17096; Heating of poultry pens, 17098; Leprosy in Calcutta, 17373; Sunlight affecting N cycle in soil, 17436; Pliocene climates, California, 17475; Pliocene climate, Oregon, 17478; Miocene climates, California, 17479; Thermal death point (freezing) of corn, 17591; Peach ripening, 17628; Forest resistance of *Arucaria*, 17646; Shelterbelts, 17650; Humidity and pollen viability, 17695; Photoperiodism—temp. effects in grasses, 17708; Photosynthesis—temp. relations, 17711; Humidity affecting cereal grains in storage, 17743; "Puffing" of tomato fruit, 17805; Plant diseases affected by light and darkness, 17822; Seasonal abundance of corn earworm, 17868; Climate affecting trematode parasitism of snails, 17946; Water temp. and growth in bass, 18043; Northward spread of southern marine fish in warm summer, 18045; Water temp. and spawning in lamprey, 18046; Temp. as affecting activity of reptiles, 18053)

16230. ARCTOWSKI, HENRYK, (compiled by). A bibliography of scientific papers on climatic variations. 254p. Mimeographed. International Geographical Union, Commission of Climatic Variations: Lwow, 1938.

16231. BILHAM, E. G. The climate of the British Isles; being an introductory study of official records for students and general readers. xix+34p. 2 pl. British Meteorological Office: London, 1938.—This is a very thorough and up-to-date treatise; it will probably for years be the chief reference on British climate, outside the annual "British Rainfall" reports and the extenso climatological data reports regularly issued by the British Meteorological Office. Bibliographies at the end of each chapter.—R. G. Stone.

16232. BREZINA, E., und W. SCHMIDT. Das künstliche Klima in der Umgebung des Menschen. viii+212p. 22 fig. F. Enke: Stuttgart, 1937.—A professor of hygiene and a professor of meteorology coöperated to write this book on the climate which man has created, partly purposely and partly involuntarily, around himself. The late W. Schmidt was so well known an authority on small-scale climate that this, his last work, will find due attention among meteorologists. The artificial climate—air conditioning—has already gained such importance in everyday life that a scientific discussion of underlying facts and principles is a necessity. The climatic elements for such discussion are: temp. and air movement, singly and combined as cooling power; humidity, air suspensions; and radiation. The heat balance of the human body and the effect of clothing upon it are discussed. The house and its properties as protection against climatic effects; the climatology of a room with the important details of heating and ventilating are presented. Climate of working places and climatization machinery find short consideration. The rest of the book is devoted to peculiarities of city climate, smoke, dust, and air-borne

disease. Observational data, which ably illustrate the various items, are mostly taken from central European material; also the quotations from the literature are mostly restricted to references in the German language. Some of the radiation and temp. tables have not been published heretofore and give mostly material collected in and near Vienna. The important factor of "dust" might have been more adequately dealt with; practically no word is offered about dust in factories and mines, etc. As a whole the book should be stimulating not only to meteorologists, pointing toward important applications and new research, but also to architects and city planners. It is a piece of pioneer work and should be commended particularly because of the close cooperation of 2 fields which have so many inherent relations but where research workers on either side are usually so far apart.—H. Landsberg.

16233. BRUNT, D. Physical and dynamical meteorology. 2nd ed. 428p. Illus. University Press: Cambridge, England, 1939.—The standard and most up-to-date treatise in English on physical meteorology; presumes some mathematical and physical knowledge and is intended as a text for advanced students and as a reference on fundamentals. The wave-theory of cyclones and isentropic analysis are not discussed, however, and the descriptive meteorology and synoptic meteorology are not covered so extensively nor authoritatively.—R. G. Stone.

16234. DEAN, L. A. Relationships between rainfall and coffee yields in the Kona District, Hawaii. *Jour. Agric. Res.* 59(3): 217-222. 1 fig. 1939.—Statistical analyses of data on rainfall and coffee production for the years 1901 to 1936 in the Kona district of Hawaii show 2 distinct periods of heavy rainfall and 1 period of markedly light precipitation. The dry season occurs during the winter, and the months that have low mean rainfall have the most irregular rainfall. Much of the variability in annual coffee production may be ascribed to fluctuations in the Feb. to June rainfall occurring during the years in which the fruiting wood was produced. The regression of coffee prod. (y) in millions of lbs. per annum with (e) the early rainfall from Feb. to June, and (t) the time in years, which was derived from various partial coefficients, was $y = 0.285t + 0.08e - 1.67$, and this gave fairly accurate forecasts of production.—L. A. Dean.

16235. GARNETT, ALICE. Insolation and relief, their bearing on human geography of alpine regions. *Inst. British Geographers Publ.* 5. 1-71. Illus. 1937.—Useful for technical discussion of distribution of sunshine on alpine slopes.—R. G. Stone.

16236. HOUGHTEN, F. C., C. GUTBERLET, and A. A. ROSENBERG. Summer cooling requirements in Washington, D. C., and other metropolitan districts. *Heating, Piping and Air Conditioning* 11: 587-591. 1939.—Comfort studies on 73 men and women working in the cooled offices of the Federal Reserve Building, Washington, D. C., confirm previous laboratory and field studies in that an effective temp. of about 71°F is the most popular in warm weather after the occupants have become adapted to the cooled atmosphere.—C. P. Yaglou.

16237. HOUGHTON, H. G., and W. H. RADFORD. On the measurement of drop size and liquid water content in fogs and clouds. *Massachusetts Inst. Technol. and Woods Hole Oceanogr. Inst. Papers in Phys. Oceanogr. and Meteorol.* 6(4): 1-31. 1938.—The possible methods of measuring fog

particles are critically reviewed. It is concluded that the only suitable method of obtaining the distribution of drop sizes present in a given fog consists in the microscopic measurement of large numbers of drops which have been collected on a properly surfaced slide. A method for surfacing microscopic slides with a thin, uniform layer of petroleum grease is described. The important problem of obtaining a representative sample of drops on a slide is next considered. Exptl. results indicate that slides no larger than 5 mm. square will collect satisfactory samples if exposed facing the wind. Larger slides discriminate against the smaller drops. Special fog microscopes which have been constructed for observing droplet samples are described, and typical results obtained in natural fogs are presented. Although 40 sets of data have been procured in 16 fogs, it has not been possible to correlate the drop-size data with any of the accompanying meteorological conditions. There is no evidence of mass grouping, such as Kohler observed in clouds; however, definite conclusions cannot be drawn from such a small amt. of data. The usefulness of fog-water data is indicated and possible methods of procuring them are reviewed. An investigation of the sampling problem encountered in the operation of the apparatus is discussed. The essential part of the new instrument is a unit comprising a succession of ordinary wire screens through which a motor-driven fan forces foggy air at a measured rate. The central portion of this screen unit is removable for weighing. Liquid water determinations are made from the weight increments of this unit corresponding to the passage through it of a known volume of air as indicated by a vane anemometer. The outer section of the screen unit serves as a guard ring for the central measuring unit, thereby avoiding sampling errors, and at the same time functions as the collector of samples of fog water for chemical analysis. From the results of numerous measurements it has been determined that in the typical advection fogs which occur at Round Hill the liquid water content may range up to 0.25 g/m³. Total dissolved salt contents of from 8 to 480 mg/l have been observed. The number of drops per cc. of foggy air is usually less than 5.—*Auth. abst.*

16238. LAMB, H. H. Industrial smoke drift and weather. *Quart. Jour. Roy. Meteorol. Soc.* [London] 64(277): 639-643. 2 fig. 1938.—Local data from Scotland are presented as showing that drift from industrial smoke pollution of the air may give rise not only to fog but also to slight rain or drizzle and lowered cloud.—*Courtesy Exp. Sta. Rec.*

16239. LEWIS, A. D. Rainfall normals up to the end of 1935 (Union of South Africa). 162p. 4 maps. Dept. Irrig., Meteorological Office: Pretoria, 1939.—Ten more years' records are made available than in the previous publication on the subject (1925) and the average annual isohyetal map (1:1,500,000) by A. D. Lewis is here much improved owing to availability of the new topogr. map of the Union on 1:500,000; the isohyets being interpolated with regard to topography. Extensive tables give the monthly and annual normals in inches (to 100ths) for over 5,000 stations. No descriptive text as the text in the 1925 report is still valid. The new data indicate greater area of dry land and desert in the low veld and Basutoland than previously believed.—*R. G. Stone.*

16240. LOEWY, A., and E. WITTKOWER. The pathology of high altitude climate, with contributions to the climatology of highland regions and to the constitution of high-altitude inhabitants. 212p. Oxford Med. Publ.: London, 1937.—Authoritative, thorough work. Bibliography.—*R. G. Stone.*

16241. MIEGHEM, J. van. Prévision du temps par l'analyse des cartes météorologiques. *Inst. Belge de Recherches Radioscientifiques*. 6: 1-138. 2 maps, 58 fig. 1936.—The author is an accomplished disciple of the Bergen School in both the theoretical and synoptic spheres. This little book is a very clearly written and beautifully illustrated presentation of the elements of air mass and frontal analysis, a synthesis of the various papers of the Norwegian practitioners. Though the treatment of each point is rather brief a surprisingly comprehensive array of topics is covered. The procedure in analyzing actual maps is outlined and some examples on typical western European situations shown.—*R. G. Stone.*

16243. MOERIKOFER, W. Meteorologische Strahlungs-

messmethoden für Mediziner und Biologen. *Fundamenta Radiologica* 4: 36-52. 1939.—A survey is given of some especially newer methods for measuring the radiation from sun and sky which for reason of their simplicity and moderate cost are well suited for biological radiation researches. The limit of errors which can be admitted for such researches is taken as $\pm 10\%$. The importance of integrating instruments giving the amts. of radiation over a longer period is pointed out as well as the necessity of taking into consideration also the diffuse sky radiation besides the direct sun radiation. The rectifier-photocell is recommended for the determination of momentary values of radiation from sun and sky. Also recommended for this purpose are the double-thermometer in a single glass container, thermoelectric pyranometers and solarimeters, and the u.-v. dosimeter for ultraviolet radiation. For measuring daily amts. of radiation the bimetallic actinograph will be suitable, also the distillation lucimeter, the grey-wedge-photometer and the solarimeter combined with a milliamper-hour counter.—*V. Conrad.*

16244. MORIN, H. G. S., et P. CARTON. Contribution à l'influence des facteurs climatiques à la repartition de l'endemie palustre en Indochine. *Renseignements techniques d'Indochine, Service antipaludique des Institute Pasteur et Service météorologique de l'Indochine* pp. 459-480. (1930).

16245. PLAMENEVSKII, M. N. [On the greatest admissible distance between the points of observation of atmospheric precipitation.] [In Russ. with Eng. abst.] *Bull. Observ. Géophys. Central (U.S.S.R.)* 1. 34-36. 1933.—The author applies the criteria of randomness of a series of observations (see: Weinberg; *Recueil de Géophys.*, 1929, v. 7, p. 1-36) to the published precipitation data from third-order ("cooperating") stations of the U. S. Weather Bureau in Ohio and Pennsylvania for the years 1920-29 and comes to the conclusion that a distance as great as 20 km, and perhaps up to 40 km, is admissible for the average distance between stations of such a network. In the same Bulletin, p. 17-22, an article by Weinberg and Plamenevskii discusses the same problem with respect to temp. observations, using Russian climatological data, computing the criteria along isotherms. They conclude that for mean annual temp. even 75 km is too big an average separation of the stations.—*R. G. Stone.*

16246. ROSS, F. W., and C. L. UTTERBACK. Intensity fluctuations in components of solar radiation with atmospheric conditions. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(2): 193-200. 1939.—The dependence of variations in the wave-length-intensity distribution upon atmospheric conditions is shown by a study of the fluctuations on different days. Three days were chosen as characteristic of clear, cloudy, and hazy days. The response of 5 temp.-controlled photocells, provided with selected filters, indicated that the variations in intensity of spectral components are functions of the wave-length band as well as conditions existing in the atmosphere at the time of observation. For comparison the observations, tabulated and graphed, are reduced to percentages of the twelve o'clock value for each day. The variations show that the observed intensity of a particular band is not a criterion of either the simultaneous intensity of any other spectral band or of the integrated response of the type of cell employed.—*Authors.*

16247. SVERDRUP, H. U. Second note on the logarithmic law of wind structure near the ground. *Quart. Jour. Roy. Meteorol. Soc.* [London] 65(278): 57-60. 2 fig. 1939.—The author critically reviews his own work and that of others and presents formulas and graphs, concluding that very near the boundary surface stable and unstable conditions influence the wind profile and the eddy conductivity according to the same law, that certain observations can be interpreted as showing that the roughness parameter of the surface is a well-defined physical quantity, and that the influence of stability can be expressed by means of a nondimensional constant. He believes that the wind profile at greater distances from the boundary surface is represented better by a power than by a logarithmic law.—*Courtesy Exp. Sta. Rec.*

16248. THORNTHWAIT, C. W., and BENJAMIN HOLZMAN. The determination of evaporation from land and water surfaces. *U. S. Dept. Agric. Month. Weather Rev.* 67(1): 4-11. 2 pl., 5 fig. 1939.—The importance and com-

plexity of the problem of determining rate and amt. of evaporation, from land and water surfaces or transpiration from vegetation are stressed. A method for determining evaporation from either land or water areas is presented in this preliminary report and its practicability is said to be demonstrated. It is also hoped that with proper instrument installation it will become possible to determine transpiration rates and moisture requirements of various field crops and forest trees, the effectiveness of various moisture-conserving practices and the relative importance of evaporation and transpiration in the hydrologic cycle. The method used is based on W. Schmidt's Austausch (eddy exchange) principle, and consists in measuring the unit area vertical transport of vapor by two sets of wind, temperature and humidity recorders, at two different heights above the ground. Once all the practical difficulties are eliminated, ecological research can make a great advance by computing climatic influences from actual water losses or gains so measured. It is interesting to note that when dew or hoar frost forms there is a "negative evaporation," i.e. deposition of water, measured by the apparatus.—*R. G. Stone.*

ANIMAL

16249. PARK, THOMAS, ELLA VIRGINIA MILLER, and CATHARINE Z. LUTHERMAN. Studies in population physiology. IX. The effect of imago population density on the duration of the larval and pupal stages of *Tribolium confusum* Duval. *Ecology* 20(3): 365-373. 1939.—When a series of *T. confusum* populations are established consisting of a constant number of larvae (10) but a geometrically increasing number of imagoes (1, 4, 16, 32, 64) the following effects are noted: The duration of the larval period is extended as the density of the imagoes increases; the larvae living in crowded imago cultures grow more slowly in terms of body weight than those in less crowded cultures; and the duration of the pupal period is not significantly affected by the crowding of larvae with imagoes. These facts are related to the ecology of populations and shown to have significance in contributing to the explanation of the decline of *T. cultures*.—*Auth. summ.*

16250. WEBER, NEAL A. Tourist ants. *Ecology* 20(3): 442-446. 1939.—Of the 16 spp. of ants taken on ships in the American tropics, 9 spp. are well-known ants which are widely distributed in the tropical and warm temperate regions of the world. Two other kinds not found on these ships with the above 9 constitute the 11 cosmopolitan spp. of ants; 1 of these 2 was found in luggage in the U. S. upon return from Cuba. *Monomorium pharaonis* was taken on 6 ships. This species and *Paratrechina longicornis* are probably the most common ship ants and may be expected on any vessels visiting ports in warm regions. A single ship carried 7 of the 11 spp. of cosmopolitan ants; 5 of these appeared to be regular inhabitants. Worker ants are regularly carried into ships in cargo and passenger luggage. When a queen is carried in cargo, a colony may become established on the ship or deposited with the cargo in an alien port. Factors governing the establishment of ants in alien lands include climate, available food, etc., but, above all, an adaptability which seems to be specific, and, in *Monomorium*, generic.—*Auth. summ.*

PLANT

16251. BAKER, H., and A. R. CLAPHAM. Seasonal variations in the acidity of some woodland soils. *Jour. Ecol.* 27(1): 114-125. 4 fig. 1939.—Acidity detns. were made monthly for 5 yrs. on the upper and lower layers of the soil in 7 stations representing 3 types of woodland soil. Statistically significant annual and monthly variations in acidity were found in all 3 types. The annual variations can be related to variations in total annual rainfall. The acidity of gravels is increased but that of clays and loams decreased during years of low rainfall. The monthly variations are in part related to large monthly variations in rainfall, but there is some evidence also of an annual rhythm in acidity. The acidity changes are ascribed to changes in micro-organic activity and, in the heavy soils, to the capillary ascent of base-rich water during dry periods.—*Authors.*

16252. BEAVEN, GEORGE FRANCIS, and HENRY J. OOSTING. Pocomoke Swamp: A study of a cypress swamp

on the eastern shore of Maryland. *Bull. Torrey Bot. Club* 66(6): 367-389. 1939.—This swamp is probably the most northern extensive area of its kind. The vegetation is dominated by cypress (*Taxodium distichum*), swamp black-gum (*Nyssa biflora*), and red maple (*Acer rubrum*), and poor drainage and light result in a limited growth of associated species. The greatest variation in dominants and subordinates is related to tide and drainage. The moisture factor results in nearly pure stands of white cedar (*Chamaecyparis thyoides*) near the upland borders and pure stands of cypress along the deeply flooded river margins. The transition from swamp to upland has the greatest variety of shrubs and herbs with an abundance of evergreens indicating the xeric nature of the habitat and showing resemblances to the pocosins of the South. Open, raised, sandy areas within and bordering the swamp are characterized by pine-barren species. The flora is more closely related to that of southern swamps than northern bogs. An analysis of the ranges of species collected indicates a preponderance of southern spp. and bears out evidence that migration has been progressing from the southeastern U. S. If left undisturbed, it appears that the swamp flora will remain essentially stable for some time to come. A complete list of spp. collected is appended.—*H. J. Oosting.*

16253. CHAPMAN, V. J. Studies in salt marsh ecology. IV and V. *Jour. Ecol.* 27(1): 160-201. 12 fig. 1939.—Section IV comprises an analysis of the salinity, exchangeable Na and Ca, and the moisture factors of salt marshes in Norfolk. Moisture is not a significant factor. The exchangeable Na behaves independently of the total chloride and it is suggested that the ion may be bound in the colloidal clay soil. Total chloride falls in the spring in the surface layers and this probably encourages seed germination. The upper and lower marshes contrast strongly in the summer as to surface salinity. Section V describes the algal vegetation, 16 communities being recognized. This vegetation is compared with that from other British salt marshes.—*V. J. Chapman.*

16254. CLAPHAM, A. R., and B. N. CLAPHAM. The valley fen at Cothill, Berkshire. Data for the study of post-glacial history. II. *New Phytol.* 38(2): 167-174. 3 fig. 1939.—Certain water-filled depressions at Cothill were interpreted as old peat-cuttings, and the stratigraphy and depth of peat were recorded along a number of transects both of the main and subsidiary valleys. The contours of the valley floor and peat surface were mapped. Pollen samples were collected. The stratigraphy of the valley fen is explained with the aid of a contour and a profile chart together with an analysis of the peat deposits.—*J. R. King.*

16255. DEEVEY, E. S. Jr. Studies on Connecticut lake sediments. I. A postglacial climatic chronology for southern New England. *Amer. Jour. Sci.* 237: 691-724. 11 fig. 1939.—Eight profiles from 5 lakes and bogs in southern Connecticut were analyzed for fossil pollen. The resulting vegetational sequence is employed as a climatic chronology, and attempts are made to correlate the succession of events with other pollen chronologies in eastern North America. Because of the chronologic uncertainties created by the irregular deglaciation of Connecticut, the sequence can not be directly related to varved-clay chronologies, and it is suggested that all North American pollen profiles are probably incomplete, since they have been secured from kettles in which initial deposition did not coincide with the inception of deglaciation. The vegetational succession is divided into 6 periods: Period A-1, spruce-fir (cool); period A-2, spruce-maximum (last oscillation of ice-border in New Haven region, cooler); period B-1, pine (warmer, dry); period C-1, oak-hemlock (warm, moist); period C-2, oak-hickory (warm, dry); period C-3 (at stations near the coast) oak-chestnut (warm, moist). During period C-3 a dichotomy is evident, in that the northernmost profile (near Middletown, ca. 30 miles inland) is characterized by spruce-hemlock (cool, moist). The evidence that local oscillations of the ice-border may be accompanied by climatic deterioration (period A-2) consists in part in a demonstration of comparable relations in Indiana, Wisconsin, and Illinois. Particularly close resemblances to the Connecticut sequence are found in eastern Canada (Auer) and Ohio (Sears). The hickory-maximum (C-2) during the mixed-deciduous forest period is tentatively correlated with the world-wide climatic op-

timum. Subsequent changes of climate differed with latitude and continentality, so that moister conditions supervened at southern stations (coastal Connecticut, Ohio, Illinois, etc.), while cooling has taken place at more northern stations (eastern Canada, inland Connecticut, Wisconsin, Minnesota, etc.). In a deductive analysis of the relation between correlation and contemporaneity the climatic optimum is attributed to extraterrestrial causes, and regarded as contemporaneous in the absolute sense in all parts of the world. In this respect it is believed to differ from the earlier segment of the climatic chronology, in which events are determined by the proximity of a retreating glacier-terminus, and which is consequently considered as relative. The chronology established for southern Connecticut will be employed in later articles of the series, in which certain limnological questions, in particular biochemical and biological evidence for typological succession in lakes, will be treated by the author and others. Consequently preliminary results of structure-analysis of sediments are presented, and the terminology of organic lake deposits is briefly discussed. "Ooze" is proposed as a translation of the Swedish term "gyttja," and "lake peat" for the Swedish "dy."—E. S. Deevey.

16256. DOBBS, C. G. The vegetation of Cape Napier, Spitsbergen. *Jour. Ecol.* 27(1): 126-148. 2 pl., 6 fig. 1939.—A shingle cape in an inland fjord (lat. 78° 39' N) with associated "salt marsh" and silted area, which was described by J. Walton in 1922, has been studied in greater detail and the vegetation recorded with the aid of a map and "frequency transect" graphs, expressing results obtained by ring sampling at intervals along certain lines. Changes since 1921 are slight, indicating a slow development. They include: further colonisation of the mudflats by salt marsh plants, especially *Puccinellia phryganodes*, filling up of a pool with wet "tundra" vegetation, and indications that a part of the silted area is slowly drying out. Modifications are suggested in the scheme of succession put forward by Walton.—C. G. Dobbs.

16257. GODWIN, H., and G. F. MITCHELL. Stratigraphy and development of two raised bogs near Tregaron, Cardiganshire. *New Phytol.* 37(5): 425-454. 1 pl., 9 fig. 1938.—A detailed record is given of the profiles of these 2 bogs. The paper is well illustrated with text figures, to which continued reference is made in the description of the successive zones of the bog deposits. Data were secured by borings and pollen analyses.—J. R. King.

16258. HOFFMANN-GROBÉTY, A. Analyse pollinique d'une tourbière élevée à Braunwald. *Ber. geobot. Forschungsinst. Rübel Zürich* 1938: 67-71. 1 fig. 1939.—The bog is situated 1580 m. altitude in the *Picea* belt. The stratigraphical sequence demonstrates its origin in a little tarn, ca. ½ m. limnic sediments occurring below 5 m. peat. The zones of the pollen diagram are successively dominated by *Pinus*, *Corylus*, *Quercetum mixtum*, *Abies alba* and *Picea excelsa*. As the recent pollen rain is in good accordance with the composition of the surrounding forest, it is supposed that the *Quercetum mixtum* and later also *Abies* forest have occurred in this region, which is now much higher than the respective vegetation belts.—K. Faegri.

16259. LINDQUIST, B. Die Fichtenmykorrhiza im Lichte der modernen Wuchsstoffforschung. *Bot. Notiser* 1939(2): 315-356. 11 fig. 1939.—"Sterilized" coniferous plants grown in sand cultures reacted to sterile extracts from various fungi. In many cases the plants could utilize the nutrients even with minute additions of extract, manifesting itself in increased growth of needles, trunk and roots. Extracts of a few parasitic soil fungi, however, retarded growth. In most cases the presence of mycelia in the nutrient media suffices to increase or retard growth. It is assumed that favorable mycorrhiza fungi excrete growth-promoting substances. The author, however, furnishes no general explanation of the symbiosis between coniferous plants and mycorrhiza fungi, but has included a discussion about various theories suggested from time to time regarding the nature of mycorrhiza formations and their stimulating effect on higher plants. A concluding section deals with the theory that plant food exchange may be the cause of mycorrhiza symbiosis.—T. R. Swanback.

16260. MANN, H. H. The weed herbage of a slightly acid arable soil. *Jour. Ecol.* 27(1): 89-113. 1939.—The weed

herbage was studied in the field on a light sandy loam of slightly acid character which has been under continuous wheat and barley cropping for over 50 yrs., with various manurial treatments up to 1926. Roughly half the year's growth of plants had germinated before the end of April. A single year's fallow was not very effective in getting rid of the weeds which had grown on this land; 2 years' fallow brought about a fairly large reduction. Acidity of the soil induced by previous manuring with $(\text{NH}_4)_2\text{SO}_4$ had a great influence and when the pH value was lower than 5 annual plants consisted almost entirely of *Spergula arvensis*, with a small amount of *Polygonum aviculare* and *Poa annua*. *Matricaria inodora*, though an acid-loving weed, disappeared almost entirely when the pH value was less than 5.4, but was also reduced in amount when it was greater than 5.8. Each of the weeds studied seemed to have a definite range of pH value in which it was at its best. The effect of the long continued addition of mineral manures was very small. Annual addition of farmyard manure for 50 yrs. has left a legacy of an increased amount of most of the weeds. The effect of lime on the weed herbage was almost entirely governed by the change in acidity thereby induced. Perennial weeds becoming important were:—(a) *Holcus mollis* and *Agrostis stolonifera*, serious in the more acid plots, but almost eradicated by 2-year fallow, (b) *Rumex acetosella* also in the more acid plots not removed by a fallow of 2 years, (c) *Equisetum arvense*, encouraged by the fallowing of the land, but absent from the more acid plots. *Tussilago farfara* appeared to be indifferent to the previous treatment of the land, but entirely disappeared after the fallowing operation.—W. H. Pearsall.

16261. MILTON, W. E. J. The occurrence of buried viable seeds in soils at different elevations and on a salt marsh. *Jour. Ecol.* 27(1): 149-159. 1939.—Samples of soil were examined for their buried viable seed content in relation to the surface vegetation at successive elevations on 2 mts. in Wales. As the elevations increased, the quantities of some spp. became less in the surface vegetation, and their amts. of buried viable seed became correspondingly less in the soil; other spp. which were abundant in the herbage throughout the slopes showed little decline in their buried seed quantities, except at the highest elevations. The limit in elevation for certain spp. was reached early in the series, both in regard to buried seed and surface vegetation. There were indications that certain spp. rely chiefly upon vegetative means for their perpetuation, especially at the highest elevations sampled—2400 and 2600 ft. The data also gave evidence of the large numbers of buried viable seeds to be found in wet soils. The buried viable seed content of soils from a salt marsh showed that of the spp. composing the various associations, few were outstanding in having comparatively abundant viable seeds in the soil. The evidence indicated that vegetative means are extensively used by certain species for perpetuation: some species dominant in the surface vegetation had comparatively few buried seeds, other spp. had many. The data from soil in proximity to the river differed markedly from those of soil from the landward side of the section investigated.—W. E. J. Milton.

16262. REES, T. KENNETH. A *Rivularia bullata*-*Balanus* community. *Jour. Ecol.* 27(1): 62-66. 1939.—The upper and lower limits of a *R. bullata* community growing on *Balanus* at Kennack, Cornwall, are described. The method of inter-seasonal existence of *Rivularia* is considered. In culture, thin-walled spores and hormogones develop into new colonies after a period of quiescence. It is suggested that the *Rivularia*, confined wholly to *Balanus*, may be a biologic form. Stress is laid on considering the sea-shore as a biome.—T. K. Rees.

16263. RICHARDS, P. W. Ecological studies on the Rain Forest of southern Nigeria. I. The structure and floristic composition of the primary forest. *Jour. Ecol.* 27(1): 1-61. 2 pl., 7 fig. 1939.—The Rain Forest of south-western Nigeria was examined with the chief object of comparing it with Rain Forest in British Guiana and Sarawak. The Rain Forest of the whole of south-western Nigeria is situated near its climatic limits. The annual rainfall varies from over 2600 mm. to just over 1600 mm., but the dry season is strongly marked, 2-5 consecutive months have less than 50 mm. Where the annual rainfall falls below 1600 mm., the Rain Forest gives place to Mixed Deciduous Forest, but

the annual rainfall is not believed to be the factor directly responsible for the boundary between the two. Only 2 types of primary Rain Forest were met with, the Mixed Rain Forest and the Fresh-water Swamp Forest. The former is considered to be the climatic climax of the region and the latter an edaphic climax conditioned by a high-water table. A number of soil profiles in primary Mixed Rain Forest are described: these soils belong to the Tropical Red Earth or Yellow Earth types. The stratification of the Mixed Forest is described with the help of profile diagrams. There are 3 fairly well-defined stories of trees at 120-150 ft. (37-46 m.), 50-120 ft. (15-37 m.) and up to 50 ft. respectively. Beneath the tree stories there are ill-defined shrub and herb strata. The herb stratum is composed of synusia of shade-loving and shade-tolerating species: the latter are analogous to the "wood marginal" spp. of temperate woodlands. The synusia of climbers and epiphytes are described. The epiphytic vegetation of the region is remarkably poor in species. The floristic composition of the Mixed Forest was studied by enumerating according to their vernacular names all trees of 4 in. (10 cm.) diam. and over on three sample plots each 160,000 sq. ft. (1.49 ha.) in area.—*W. H. Pearsall*.

16264. SAMPSON, ARTHUR W. Plant indicators—concept and status. *Bot. Rev.* 5(3): 155-206. 1939.—Plant indicators, or species which are regarded as portraying the character of the habitat, have been recognized from medieval times. The indicator concept is based upon the cause-effect relation, where the effect is taken as a sign of the cause. The subject of plant indicators as relating to land use problems is discussed for specific areas of the United States. The indicator concept also is applied to land evaluation studies, to archeological land use history, to life zones and utilization problems, and to range and forest. Although there are many kinds of plant indicators, communities of plants are to be regarded as more reliable than individual species. In the future, as sounder evidence is accumulated, broader use of indicator communities and species may be expected.—*A. W. Sampson*.

16265. SHIVELY, S. B., and J. E. WEAVER. Amount of underground plant materials in different grassland climates. *Nebraska Conserv. Bull.* 21. 1-68. 33 fig. 1939.—A study was made of the amount of underground plant materials at 5 groups of stations centering, respectively, at Anita, near Atlantic, in southwestern Iowa, at Lincoln in southeastern Nebraska, at Nelson 90 miles southwestward, at Phillipsburg in north-central Kansas, and at Burlington in eastern Colorado. All samples, which were 0.5 sq. m. in area and 10 cm. deep, were taken in silt loam soil. Mean annual precipitation decreased from east to west in the several areas as follows: 33 to 29 to 26 inches in true prairie, and to 23 and 17 inches in mixed prairie. Mean annual temp. remained fairly constant—about 49° to 53°F. Zonal soil groups varied from prairie to chernozem and then to dark brown and brown soils. Underground plant materials were secured by washing away the soil. Volume was determined by displacement of water, and the oven-dried material was weighed. A series of 22 samples of little bluestem (*Andropogon scoparius*) from the Anita, Lincoln, and Nelson areas yielded 3.15, 2.6, and 2.34 tons per acre, respectively, of underground plant parts. Underground yield of a series of 27 samples of big bluestem (*A. furcatus*) decreased from 4.54 tons per acre at Anita to 3.54 at Lincoln and to 3.17 tons in the areas westward. Yields of a series of 16 samples of mixed bluestems from the Anita, Lincoln, and Nelson areas were 3.42, 2.83, and 2.54 tons per acre, respectively. Statistical treatment of the data from each series shows that the correlation between volume and weight is very significant. The coefficients of correlation are .870, .874, and .699, respectively. The difference between the mean of the dry weight of little bluestem from the Anita area and that from either the Lincoln or the Nelson area is very significant. The mean of the dry weights of big bluestem from the Anita group is significantly different from that of each of the other groups, and the mean of the Lincoln group is significantly different from the mean of the combination of the 3 drier western groups. The mean of the dry weight of mixed bluestems from the Anita group is significantly different from that of either the Lincoln or Nelson group. Correlation between the average dry weight

and the mean annual precipitation at each station was found to be very significant. The coefficient of correlation of the little bluestem series is .642, of the big bluestem series .673, and of mixed bluestems .827. Blue grama grass (*Bouteloua gracilis*) and buffalo grass (*Buchloe dactyloides*) showed no consistent variations in yields from the Lincoln area where they occurred sparingly to the short-grass plains disclimax where they are dominant. Yields varied between 2 and 2.35 tons per acre. Weights of 82 samples of upland grasses showed a consistent decrease with decreasing precipitation westward. They were 3.35, 2.69, 2.43, and 2.19 tons per acre, respectively, the last figure being the average from the 2 driest areas. Coefficients of correlation between volume and weight in the sequence of station groups are .812, .695, .847, .953, and .907, respectively. The mean of the Anita group is very significantly different from that of each of the other groups. The means of the Lincoln and Nelson groups combined and that of the Phillipsburg and Burlington groups combined were also very significantly different. Organic matter and N in the surface 4 inches of soil were detd. at 4 stations in each of the 5 areas. Average percentage of organic matter decreased from east to west from 7.14, 6.08, 5.41, and 4.42 to 2.67. Statistical treatment of the data on organic matter shows that the mean from each area is significantly different from the mean of any other area. N % decreased from .308, .271, .248, and .198 to .130. Although no significant difference is found between Lincoln and Nelson, otherwise the mean from each area is very significantly different from that of any other area. The extent and types of prairie are discussed. The fact that prairie is an organic entity with interrelated parts developed and adjusted through very long periods is emphasized. Importance of grasses, which are well adapted by structure and habit of growth to withstand grazing, is discussed together with the relation of the non-grasses or forbs. The significance of the layering habit of grassland species both above and below ground is pointed out. The powerful reactions of grassland as a soil-building influence are shown and how they introduce both directly and indirectly the biological factor into soil formation. Vegetation exerts numerous reactions on the water relations, chiefly interception of rainfall, prevention of runoff, and removal of water by absorption and transpiration. The surface soil of prairie is anchored by 2 to 4 tons per acre of a fibrous network of roots and rhizomes. A single strip of virgin sod 100 inches long and 8 inches wide is threaded with many miles of root length.—*J. E. Weaver*.

16266. SHREVE, FORREST. Observations on the vegetation of Chihuahua. *Madroño* 5(1): 1-13. Map, 3 pl. 1939.—Five physiographic regions are recognised in the state: bajada, enclosed basin, elevated plains, Sierra Madre and barranca. The larger types of vegetation are distributed in close accord with the physiographic regions. The bajada region is desert, dominated by bushes and small cacti. The enclosed basins are desert, with more or less stabilized sand and open vegetation of low trees, bushes and yuccas, or else are open desert grassland. Desert merges into grassland, which occupies the elevated plains. Evergreen oak forest covers the hills of the elevated plains and has the same vertical range as the grassland, 1700 to 2200 m. Pine forest covers the Sierra Madre above 2150 m., with variable admixture of oaks, and descends to 1800 m. on the Pacific slope. The barranca region occupies the canyons of the Pacific slope and has a mesic forest of evergreen and deciduous trees. Descriptions of the types of vegetation are accompanied by short lists of dominant species.—*F. Shreve*.

16267. SINGH, B. N., and K. DAS. Percentage frequency and quadrat size in analytical studies of weed flora. *Jour. Ecol.* 27(1): 66-77. 4 fig. 1939.—While investigating the distribution of the individuals of weed spp. in small plots of arable land which were left fallow for a short duration, the relationships between the percentage frequency and density and between the quadrat size and mean number of spp. were studied. The theoretical logarithmic relation between percentage frequency and density holds in the case of the weed species, but is only approx. true since most of the weed spp. show a small degree of heterogeneity in the distribution of their individuals. When calculated and observed densities are compared by their standard errors as determined by the formula suggested by Bartlett, it is

revealed that although the weed species are characterized by a slight degree of heterogeneity, the densities of some species may be determined. The difference between the observed and calculated densities is insignificant for those spp. where the agreement with the calculated Poisson series terms is significant. When the relationship between the quadrat size and the average number of species found within the quadrat size is studied, a disagreement between the field and calculated data is revealed which however improves when the less common species are excluded. The disagreement is correlated with the heterogeneity in the distribution of the individuals of the weed spp.—*Auth. summ.*

16268. STEPHENS, C. G., and R. F. CANE. The soils and general ecology of the north-east coastal regions of Tasmania. *Papers and Proc. Roy. Soc. Tasmania* 1938: 201-207. Map, 1 pl. 1939.

16269. TURNER, JOHN S., and A. S. WATT. The oak-woods (*Quercetum sessiliflorae*) of Killarney, Ireland. *Jour. Ecol.* 27(1): 202-233. 2 pl., 9 fig. 1939.—A natural oakwood near Killarney, south-west Ireland, is described. The wood grows on very acid, mostly podsolized soil in a region characterized by a pronounced oceanic climate—high rainfall, high N/S ratio and for its latitude a high mean annual temp. with a small range. The dominant tree (*Quercus sessiliflora*) is deciduous but the abundance and vigor of the evergreens *Ilex aquifolium*, *Calluna vulgaris*, *Vaccinium myrtillus* (green shoots) etc., the wealth of bryophytes both in species and individuals, and the ferns *Hymenophyllum tunbridgense* and *H. peltatum*, suggest the nearest approach to evergreen hygrophilous forest possible with the limitations imposed by past climatic sifting of the flora. The wood exists in 3 varieties related to 3 stages in podsolization of the soil: comparative data for size and number of the important spp., and accurate profile transects of the vegetation are given for the 3 types. These data are obtained from representative plots 25 ft. × 75 ft. to 125 ft. The development of the vegetation is described from one place: bare rock with occasional plants in cracks → *Ulex gallii*—*Calluna vulgaris* heath → *Ilex aquifolium*—*Arbutus unedo* scrub → *Quercus sessiliflora* woodland summarizes the succession. *Arbutus* is a plant of serial stages: in W. Ireland it is a light-loving plant and cannot survive the shade of the oak but may survive in the one type where the oak does not grow taller than the *Arbutus*. A summary of the distribution of the bryophytic communities and their succession on the trees and boulders is given. The full account of P. W. Richards is given in *Annales Bryologici* 11, 108, 1938.—A. S. Watt.

OCEANOGRAPHY

16270. BERNARD, FRANCIS. Étude sur les variations de fertilité des eaux Méditerranéennes. Climat et nanoplankton à Monaco en 1937-38. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(2): 228-241. 1939.—This is the summary of 3 yrs. research on the nanoplankton and its relation to the Mediterranean climate. In winter the sea is isothermic, and the vertical exchanges of water are due to differences of salinity. (The volume of nanoplankton was greater in 1937 because the rainfall was greater than in 1938.) In summer, vertical changes of temp. are the most important source of local fertility. In spring and autumn, the wind seems to be the principal agency affecting life in the sea; sunshine is almost always sufficient for marine photosynthesis, and weak exchanges of water are the cause of scarcity of organisms. The greatest maxima of Protista occur at the same time in every year, because in the Mediterranean the maxima of wind and rain are rather regular. *Coccolithus fragilis* is the commonest Flagellate.—F. Bernard.

16271. FLEMING, RICHARD H. The control of diatom populations by grazing. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(2): 210-227. 1939.—The fluctuations in diatom populations must be largely detd. by variation in the intensity of grazing. The specific problem considered is that of the development of a large diatom population in a given water mass and its subsequent disappearance. An equation is presented to express the change in population when it is assumed that the diatoms divide at a constant rate and that the fraction of the population removed each day by grazing increases. If the division rate of the diatoms

is known it is possible to compute the production. The production represents the increase in the number of diatoms over and above the original population and includes those which have been consumed by the grazers. The fraction of the population consumed each day is shown to depend upon the number of grazers as it has been observed that these feed by "filtration" and that the filtration capacity is independent of the diatom population. The equations developed are applied to data from the English Channel.—R. H. Fleming.

16272. GIBBONS, S. G. The Hensen net. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(2): 242-248. 1 fig. 1939.—The incorrect sampling by various plankton nets due to size of organism and differing local conditions is discussed in the light of clogging of the net. Comparison of catches between Hensen and Standard silk nets under widely varying conditions shows a 500% discrepancy. Remarks are included on the scarcity in a small volume of water of even abundant forms, and attention is drawn to the advantages of the modern centrifugal pump. A reiteration of the difficulties with vertical nets due to ship drift concludes the paper.—S. G. Gibbons.

16273. RUSSELL, F. S. Hydrographical and biological conditions in the North Sea as indicated by plankton organisms. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(2): 171-192. 1939.—The article is a summary review of recent work on the use of plankton organisms for indicating water movements and biological conditions in the North Sea area. Our knowledge of the indicator species for the different types of water is outlined and the bearing of this work on fishery research is discussed. A bibliography of references dealing with this research in the North Sea area is given.—F. S. Russell.

LIMNOLOGY

(See also in this issue Entries 16277, 16283)

16274. BERG, KAJ. Studies on the bottom animals of Esrom Lake. *K. Danske Videnskab. Selsk. Skrifter Nat. Og Math. Afd. Ser. 9. 8: 1-255. 17 pl., 183 fig. 1938.*—The area of the lake is 17.3 sq. km., the max. depth 22 m. and the mean depth 12.3 m. It belongs to the eutrophic class since the lower water contains very little dissolved oxygen in late summer and early fall. The Ca content of the water is 39-42 mg. per l. and Mg 5.2-5.6 mg. per l. The bottom samples were taken along a single line extending from 0.2 to 20 m. 12 series of double catches were taken at 7 different depths during a period of a little more than a year; many other double samples were taken to supplement the observations on certain animals. On the basis of the results 3 zones are indicated: (1) the littoral, occupied by rooted plants, 0-4 m.; (2) the sublittoral or transitional, occupied chiefly by the mollusk *Dreissensia polymorpha*, 4-15 m.; (3) the profundal, 15-22 m. The greatest variety of forms (29 spp.) was found in the littoral zone; the sublittoral had a maximum of 20 spp. and the profundal only 6. The average number of animals in the littoral was 8000 per sq. m., with a live weight of 200 g.; the number in the sublittoral was 7700 per sq. m., weighing 5360 g. and in the profundal 5000 per sq. m., with a live weight of 46 g. The unusually large weight of bottom animals in the sublittoral zone was due to the presence of large numbers of *Dreissensia*; the other animals constituted less than 1% of the total weight in this zone.—C. Juday.

16275. WRIGHT, STILLMAN. Chemical conditions in some waters of Northeast Brazil. *Ann. Acad. Brazil. Sci.* 9(4): 277-306. 3 pl. 1937(rec'd 6-10-39).—The 4 localities studied are artificial lakes (açudes), near Campina Grande, Parahyba. The area lies on the boundary of the dry zone of N. E. Brazil and has marked diurnal temp. variations, seldom less than 7°C or more than 13°C; seasonal variations are less well marked. The rainfall is variable from year to year, averaging 798 mm. per annum; most of this falls in March, April and May, though April may constitute a dry break in the rainy season. The 4 lakes are rich in chloride and carbonate, and the conc. of these substances shows a seasonal cycle, being highest at the end of the dry season and falling during the rains. The details of the cycle depend on the local details of rainfall distribution. Açude Simão may receive chloride and carbonate through submerged springs. In Açude Bodocongo and Açude Vehlo chloride

decreased relative to carbonate during 1934-5. The pH of the waters lies between 7.25 and 8.9, and fluctuates with the free CO_2 ; it is in general lowest after the rains and rises rapidly if the algal flora is rich. Thermal stratification is intermittent and best developed between Feb. and May, when temperature differences of 1.7-4°C permit a well marked chemical stratification of pH and free CO_2 . O_2 determinations proved unreliable, but suggest that the hypolimnia of the localities at times of stratification rapidly lose most of their oxygen content.—G. E. Hutchinson.

WILDLIFE MANAGEMENT—AQUATIC

(See also the section "Pisces"; and Entries 16271, 16466, 18043)

16276. ALDRICH, A. D. Results of seven years' intensive stocking of Spavinaw Lake, an impounded reservoir. *Trans. Amer. Fish. Soc.* 68: 221-226. 1938(1939).—Spavinaw Lake is an artificial reservoir 1,800 acres in area from which the City of Tulsa, Okla., draws its water supply. Fishing and boating are permitted under strict supervision. Such use of the reservoir does not apparently affect the *Bacillus coli* content of the water. Tulsa maintains a hatchery for stocking the lake with pan fish, principally black bass. An average of 195 bass per acre of lake area has been planted annually for the past 7 years. The catch by anglers has not increased materially during that time. Factors believed responsible are the increase in the population of large bass and their ability to evade capture. Expts. and observations conducted at the hatchery with adult bass demonstrate the ability of bass to acquire a keen sense of self preservation.—A. D. Aldrich.

16277. CAHN, ALVIN R. Progress report of the fisheries investigations of the Tennessee Valley Authority. *Trans. Amer. Fish. Soc.* 68: 61-65. 1 fig. 1938(1939).—The fisheries investigations are being carried out on all reservoirs as a cooperative undertaking between the Bureau of Fisheries, the Valley States Conservation Commissions (Alabama and Tennessee) and the Authority. A laboratory boat on Norris and another on the northern Alabama and middle Tennessee reservoirs are gathering basic facts on the metamorphosis of a river system into impounded waters. Biochemical, biophysical and biological data are accumulating which will throw considerable light on what is going on in impounded waters. The development of a bottom fauna, the plankton organisms, the food and growth rate of the fishes, parasites, movements, are all being studied. Brush shelters are being constructed, and creel censuses undertaken. The objective is to rehabilitate the impounded waters upon a scientific and economic basis.—A. R. Cahn.

16278. GUTERMUTH, C. R. Club-operated fish hatcheries—A part of Indiana's statewide plan. *Trans. Amer. Fish. Soc.* 68: 118-123. 1938(1939).—Public apathy toward conservation can be eliminated through education and experience. The general public is interested and will help as evidenced by the activities of Indiana's 812 conservation clubs. Hoosier clubs lead in club fish propagation; this year 182 clubs operated 434 club fish hatchery ponds with an aggregate of 264½ acres of water as a part of the state's efforts to increase the fish and game population. Indiana's statewide conservation club organization, made up largely of rural clubs, has completed its 5th year of successful operation and this plan has been so successful that it was used as a model by the National Wildlife Federation.—C. R. Guteruth.

16279. HESS, A. D., and J. H. RAINWATER. A method for measuring the food preference of trout. *Copeia* 1939(3): 154-157. 1939.—Soft-bodied insects were digested and passed through the alimentary tract of *Salvelinus fontinalis* much more rapidly than heavily chitinized forms. A method is presented whereby this factor can be taken into consideration in determining the relative numbers of different kinds of food organisms eaten by trout. The relative preference for different kinds of food organisms is then taken as the ratio of the relative numbers eaten to the relative numbers available.—Authors.

16280. MOULT, FRANK H. Laboratory apparatus for the rearing of young salmon from freshly fertilized eggs. *Cons. Perm. Internat. Explor. Mer Jour. Conseil* 14(2): 271-273. 1939.—Water passes through perforated zinc tray

holding the eggs. For 4 months the mortality among 2,000 specimens was 0.5%.—F. H. Moul.

16281. PRÉVOST, GUSTAVE, and LUCIEN PICHE. Observations on the respiration of trout fingerlings and a new method of transporting speckled trout (*Salvelinus fontinalis*). *Trans. Amer. Fish. Soc.* 68: 344-353. 6 fig. 1938(1939).—In view of the necessity of securing a method for the most economical transportation of trout, condition permitting the accommodation of considerable numbers of fingerlings in small volumes of water, have been determined. A uniform distribution of the fish in the tank is obtained through their vertical separation into groups by the use of perforated metallic shelves; this arrangement prevents the huddling of the fish at the bottom of the tank, and the consequent exhaustion through the continuous struggle they exhibit when this crowding occurs. It insures, at the same time, a rapid and constant diffusion of the oxygen which is supplied at the bottom of the tank by highly efficient diffusers. Fingerlings, the volume of which exceeded 50% of that of the water used, were thus comfortably accommodated for periods of 3-4 hrs. Equipment for transportation of trout by plane and a method of planting fish from the air are described.—Authors.

16282. SCHMIDT, P. J., and G. P. PLATONOV. The seasonal character of the response of fish to low temperatures. *Compt. Rend. (Doklady) Acad. Sci. URSS* 19(3): 177-180. 1938.—When sturgeon were placed in a state of anabiosis (produced by low temp.) in autumn, they revived but they did not revive when cooled in summer. The significance of this fact in connection with studies in anabiosis as well as in pisciculture is discussed.—O. Raber.

16283. SMITH, E. V., and H. S. SWINGLE. The relationship between plankton production and fish production in ponds. *Trans. Amer. Fish. Soc.* 68: 309-315. 1938(1939).—Fifteen small excavated ponds were stocked with bluegill, bream, fingerlings or fry (*Helioperca macrochira*) in the spring, 1936. 12 ponds were fertilized with inorganic fertilizers and 3 were controls. Quantitative plankton determinations were made at regular intervals throughout the season. The ponds were drained in the fall, 1936, and the fish were counted and weighed. The unfertilized controls produced 100 lbs. of fish per acre and the fertilized ponds produced up to 588 lbs. per acre. An almost direct relationship between plankton production and fish production was found.—E. V. Smith.

16284. SWINGLE, H. S., and E. V. SMITH. Fertilizer for increasing the natural food for fish in ponds. *Trans. Amer. Fish. Soc.* 68: 126-134. 1938(1939).—Expts. using commercial fertilizer in distilled water indicated that a N-P-K- CaCO_3 ratio of 4:1:1:8 gave most economic plankton production. Pond waters in central Alabama require the addition of N, P, K, and Ca for maximum fish and plankton production. For use in pond waters, the above ratio was used with the amount of P doubled, giving 4:2:1:8 ratio of N-P-K- CaCO_3 . The application of this mixture of commercial fertilizers gave a fish production of 578 pounds per acre, compared to 134 lbs. per acre in unfertilized control. The amounts of commercial fertilizers used at present per acre per application are: 40 lbs. of $(\text{NH}_4)_2\text{SO}_4$, 60 lbs. of superphosphate (16%), 5 lbs. of KCl, and 30 lbs. of basic slag (or 15 lbs. of CaCO_3).—H. S. Swingle.

16285. WILKINSON, JAMES T. Notes on the use of supplements for fresh meat in the propagation of brook rainbow and brown trout in Michigan. *Trans. Amer. Fish. Soc.* 68: 96-115. 6 fig. 1938(1939).—Brook (*Salvelinus fontinalis*), rainbow (*Salmo gairdnerii*), and brook trout (*Salmo trutta*) fingerlings were fed diets in which fresh meats were supplemented with dry animal and plant meals. Ten diets were employed including one of pure sheep liver for comparison. Trout fed diets that contained dry meals were reared at a lower cost per pound of trout (except in one case among the rainbow trout) than the controls. Mortality among the trout that received sheep liver plus dry meals in the diet was generally about as low as (in some instances lower than) that of the controls; loss among the trout that received trimmed pork "meat" (spleen from which fat has been trimmed) in the diet could in no case be compared favorably with the loss among the other trout. An epidemic of ulcer disease was most severe among the fish which were fed pork "meat"

Pure sheep liver yielded the greatest increase in weight among brook and rainbow trout. Among the brown trout 2 of the diets that contained dry meals produced better growth than did pure sheep liver. The best conversion of food ("as purchased" basis) into body tissue was obtained from some of the diets containing dry meals.—*J. T. Wilkinson.*

WILDLIFE MANAGEMENT—TERRESTRIAL

(See also in this issue Entry 17388)

16286. GRIMES, FRANK G. Abstract of fur laws, 1938-39. *U. S. Dept. Agric. Bur. Biol. Surv. Wildlife Res. and Manag. Leaflet*. BS-118. 35p. 1938.—Discusses the bearing of the Federal Lacey Act upon interstate shipments of furs, and summarizes regulations as to open and closed seasons on fur animals, possession, sale, shipment, and export of skins, and licenses to trap in states and territories of the U. S. and in the Canadian provinces.—*W. L. McAtee.*

16287. McATEE, W. L. Wildfowl food plants. Their value, propagation, and management. 14lp. 17 pls., 4 figs. Collegiate Press Inc.: Ames, Iowa, 1939. Pr. \$1.50.—It is possible, by noting the feeding habits of wild ducks and by examining the contents of their stomachs, to identify the

plants upon which they feed. Plants belonging to 41 families have thus been recognized as wild-fowl food. The majority of these plants grow in swamps and in shallow water. Methods of transplanting and raising the plants are given and the optimum habitat of each is described.—*C. Zirkle.*

16288. SHELDON, H. P. History and significance of American wildlife: II. Trends from exploitation to restoration. *U. S. Dept. Agric. Bur. Biol. Surv. Wildlife Res. and Manag. Leaflet*. BS-126. 7p. 1939.—A statement for educational use, commenting on the rapid exploitation of American natural resources, present day recognition of the need of conservation, planning wildlife restoration in the light of research, progress made in that direction and also in protective legislation, and restoration as a government function.—*W. L. McAtee.*

16289. ANONYMOUS. Two home-made traps for English sparrows. *U. S. Dept. Agric. Bur. Biol. Surv. Wildlife Res. and Manag. Leaflet*. BS-121. 6p. 3 pl. 1938.—Brief references to introduction and spread of the species; discussion of its economic status and methods of controlling damage, including detailed description (and illustration) of nest-box traps; methods of operation.—*W. L. McAtee.*

BOTANIC GARDENS OF THE WORLD

MATERIALS FOR A HISTORY

Second Edition

Statistics concerning the history, organization, and work of more than 550 botanic gardens in 80 countries, from 340 B.C. to 1937 A.D. 256 pages.

Price, \$2.50. By mail, \$2.75.

ECOLOGY

All Forms of Life in Relation to Environment

Established 1920. Quarterly. Official Publication of the Ecological Society of America. Subscription, \$5 a year for complete volumes (Jan. to Oct.). Parts of volumes at the single number rate. Back volumes, as available, \$6 each. Single numbers, \$1.50 post free. Foreign postage: 40 cents.

Orders should be placed with

The Secretary, Brooklyn Botanic Garden
1000 Washington Ave., Brooklyn, N. Y., U. S. A.

GENETICS

A Periodical Record of Investigations bearing
on Heredity and Variation

Established 1916. Bi-monthly.

Subscription, \$6 a year for complete volumes (Jan. to Dec.). Parts of volumes at the single number rate. Single numbers, \$1.25 post free. Back volumes, as available, \$7.00 each. Foreign postage: 60 cents.

BROOKLYN BOTANIC GARDEN MEMOIRS

Volume I: 33 contributions by various authors on genetics, pathology, mycology, physiology, ecology, plant geography, and systematic botany. Price, \$3.50 plus postage.

Volume II: The vegetation of Long Island. Part I. The vegetation of Montauk, etc. By Norman Taylor. Pub. 1923. 108 pp. Price, \$1.00.

Volume III: The vegetation of Mt. Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor. 151 pp., 27 text figs., vegetation map in colors. June 10, 1927. Price, \$1.60.

Volume IV: Commemoration program. 15 papers on twenty-five years of progress in botany and horticulture, 1910-1935. 133 pp., 2 text figs., 5 plates. Price, \$1.35 post free.

Orders should be placed with

The Secretary, Brooklyn Botanic Garden
1000 Washington Ave., Brooklyn, N. Y., U. S. A.

Special Reduced Prices!

BIOLOGICAL ABSTRACTS

A Reference Work That Should Be Complete in Every Library

ELEVEN VOLUMES—1927 to 1937—Complete with Indexes *—\$30 Delivered

Individual Volumes—with Indexes—Delivered

1 to 5 (1927-1931)—\$2.50 per volume

6 to 11 (1932-1937)—\$4.50 per volume

Volumes 1 to 5 (1927 to 1931) may be purchased without the Indexes
at \$1 per volume plus 50c postage per volume.

*(Index to Vol. 11 (No. 9) to be published in 1939)

Payment to accompany your order. Foreign buyers remit by New York Draft.
Make check or draft payable to BIOLOGICAL ABSTRACTS and mail to

BIOLOGICAL ABSTRACTS

University of Pennsylvania
Philadelphia, Pa.